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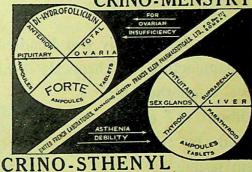
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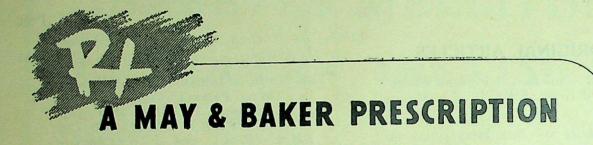
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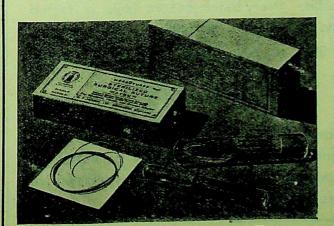
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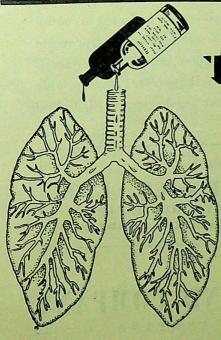
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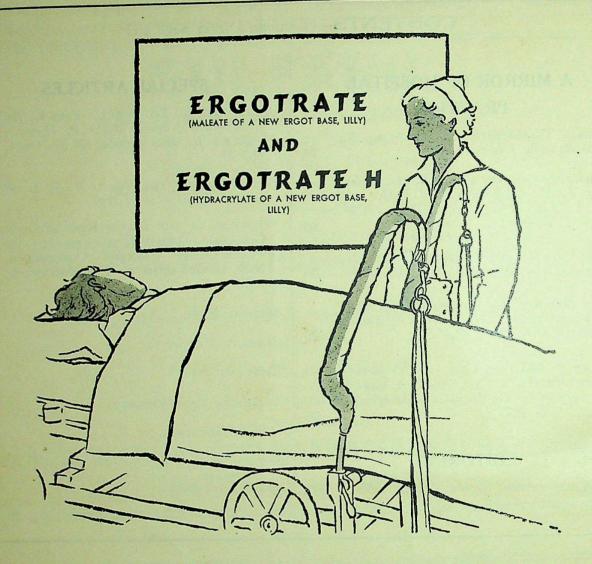
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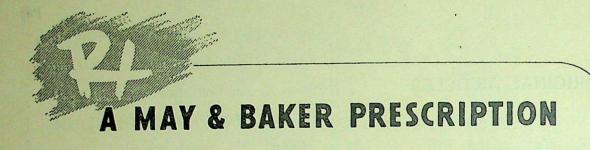
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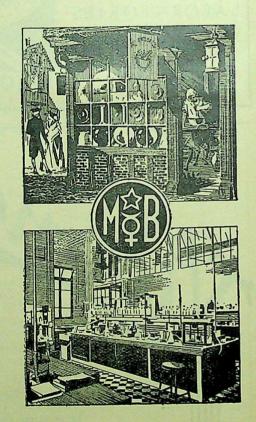
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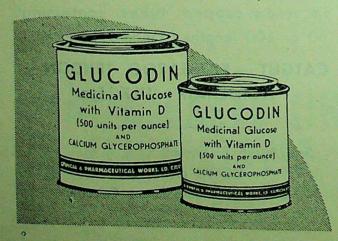
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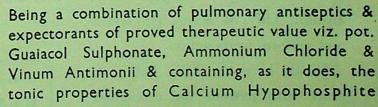
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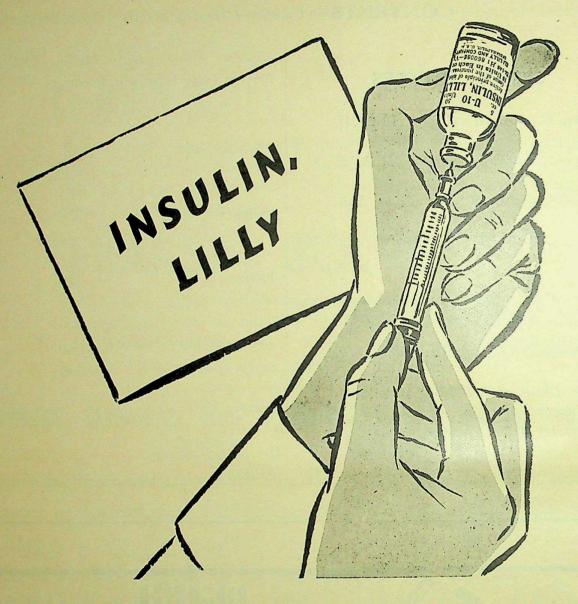


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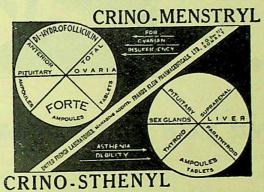
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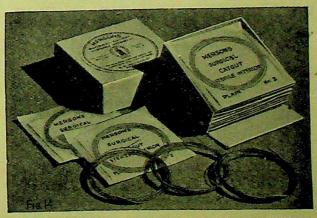
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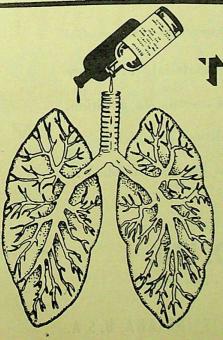
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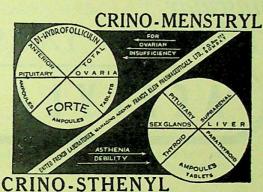
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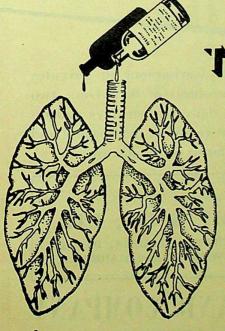
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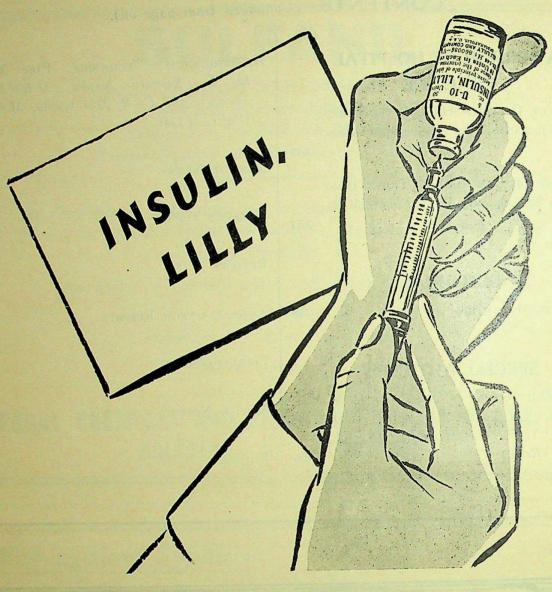
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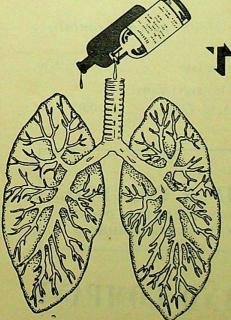
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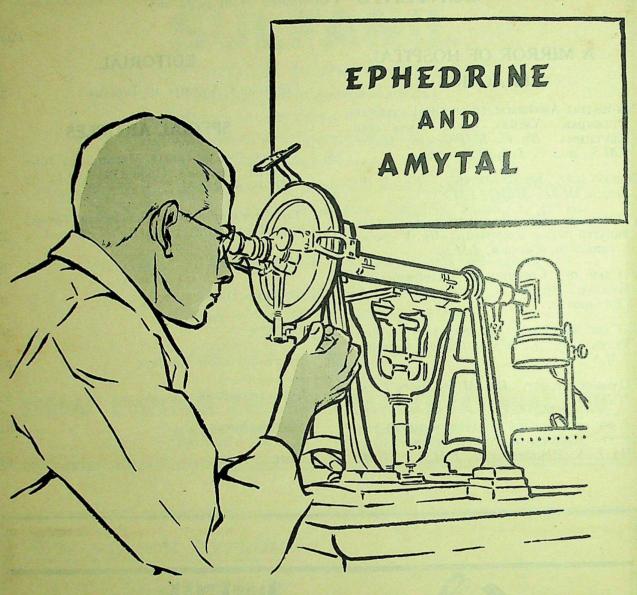
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# Original Articles

CHEMOTHERAPEUTIC STUDIES IN THE TREATMENT OF MENINGOCOCCAL AND PNEUMOCOCCAL MENINGITIS

By R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.) BREVET-COLONEL, J.M.S. (Retd.)

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and

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(From the School of Tropical Medicine, Calcutta)

A SUPPLY of diaminodiphenyl-sulphone glucoside was placed at our disposal by Dr. G. A. H. Buttle of the Wellcome Research

Laboratory for trial in meningitis.

A large number of cases are admitted every year to the Campbell Hospital, and, with the permission of its superintendent, Col. Mallya, i.m.s., the value of this drug in the treatment of meningitis was tested in a series of cases. Such cases are admitted throughout the year in Calcutta, but the disease assumes epidemic proportions during the cold weather months of December, January and February. Our experiment commenced in the middle of November 1938 and ended at the end of February 1939 when the supply of the drug under trial was temporarily exhausted; a few additional cases were treated at the end of March when a further supply was received.

The cases were not selected, but, on admission, alternate cases were treated with anti-meningo-coccal serum (which series served as a control) and with the sulphone compound. All cases were admitted to the same ward and were under the immediate care of one of us (B. C. C.) who is in joint medical charge of the infectious diseases wards at the Campbell Hospital.

Cases in the drug-tested series were given orally 0.5 gramme of the sulphone glucoside compound every two hours up to a maximum of 3.0 grammes daily. Its administration was continued until the cerebro-spinal fluid became clear or when methæmoglobinæmia appeared to be imminent. Spectroscopic examination of the blood for the appearance of methæmoglobin and sulphæmoglobin bands was carried out, and the amount of drug administered was reduced or stopped altogether when the appearance of any one of these bands was noted. All sulphates and sulphur-containing compounds were withheld and the administration of purgatives was avoided as far as possible. The drug, which is in tablet form (0.25 gm. per tablet), was always administered orally, the tablets being crushed and given as a suspension in water.

The control series received polyvalent antimeningococcal serum both intrathecally (I T) and intravenously (I V).

Usually about 40 c.cm. of serum (20 c.cm. intrathecally and 20 c.cm. intravenously) was administered every morning as long as symptoms persisted. Seriously ill patients were given a similar amount again in the evening. Occasionally 40 c.cm. was administered intravenously in addition to a variable amount given intrathecally.

In both series the patients were given in addition potassium bromide grs. x, when it was considered necessary, and a mixture containing liquor hydrargyri perchloridi, half a drachm, and potassium iodidi, five grains, three times daily, until convalescence was established. Lumbar or eisternal puncture was performed frequently as long as symptoms persisted. The cerebro-spinal fluid in all cases was examined bacteriologically, to establish diagnosis. The fluid was examined microscopically by the preparation of films (after centrifuging when necessary) and staining by Gram's method. It was also seeded on to pigeon-blood agar for the isolation of meningococci.

Thirty-three cases were treated according to the procedure above outlined; 24 of these were meningococcal infections, seven were pneumococcal, and two were bacteriologically negative. The detailed results obtained are given in the tables.

Gram-negative diplococci resembling meningococci were seen to be present, by microscopic examination, in the cerebro-spinal fluid of all the patients included in table Ia.

From a study of table Ia, it will be observed that of the five patients that died one (case 25) received only one gramme of the drug. This case was actually a control that was put on diaminodiphenyl-sulphone glucoside when the condition appeared to be hopeless and death 18) received Another (case inevitable. 5 grammes and died after only 36 hours' stay in hospital. Apart from these two, the minimum amount of drug administered to the patients that died was 13.5 grammes (case 16) and the maximum 30 grammes (case 13). The latter was doing exceptionally well, convalescence seemed to have been established and the administration of the drug had been stopped for six days when the patient relapsed. His temperature rose steeply, the cerebro-spinal fluid which had been clear became turbid again and was under pressure; headache, stiffness of the neck, etc., soon became progressively worse until death supervened. The administration of the drug was recommenced but it appeared to have no effect. The minimum amount of drug administered in the recovered cases was 10.5 grammes and the maximum was 30 grammes. so that three at least of the fatal cases received an amount of drug equal to that received by those that recovered.

Table Ia (Drug-treated group)

Details of cases treated with diaminodiphenyl-sulphone glucoside alone

Case number	Amount of drug given (in gms.)	Result	Days in hospital	Bacteriological examination	Remarks
1 3 5 13 16 18 23 24 25 27 30 36	10.5 14.0 35.0 30.0 13.5 5.0 28.0 30.0 1.0 30.0 20.0 17.5	Cured " Died " Cured Died Cured Died Cured Died Cured	8 6 22 21 6 1½ 20 24 2½ 58 10 14	N. G. I C. II N. G. C. I N. G. I II C.	Absconded; seen one month later in good health. Relapsed and died.

I = Group I meningococci isolated.

II = Group II meningococci isolated.

C. = Contaminated.

N. G. = No growth.

TABLE Ib (CONTROL GROUP)

Details of cases treated with polyvalent antimeningococcal serum that served as controls for the cases shown in table Ia

Case num- ber	AMOUNT OF ANTI- MENINGO- COCCAL SERUM GIVEN (IN C.CM.)		Result	Days in hospital	Bacterio- logical examination
	IT	IV			
2	40	60	Died	4	N.G.
2 4 8	60	190	Cured	22	Ī
8	60	60	Died	11/2	II
10	20 65	20 230	"	112	N. G. N. G.
11 15	47	100	"	10	N.G.
17	120	390	"	18	Č.
19	40	270	Cured	4 18 18	C. C. N. G.
21	30	240		23	C. I C.
26	90	120	Died	3	I
28	10	40	,,	22 (hours)	C.
29	60	330	Cured	20	N.G.
33	110	170	Died	9	N.G.
38	50	140	Died	4	N.G.

Gram-negative diplococci resembling meningococci were seen to be present, by microscopic examination, in the cerebro-spinal fluid of all, excepting two patients included in the above table. The two exceptions were cases 19 and 33.

There were therefore 12 proven meningococcal infections of which nine were fatal. Examining the cases that died there were three that remained less than 48 hours in hospital. Excluding these three the minimum amount of anti-meningococcal serum administered was 100 c.cm. (40 I T and 60 I V) during four days while the maximum was 520 c.cm. (120 I T and 390 I V). To those that recovered, 250 c.cm.

was the least amount given and the maximum 390 c.cm.

Table Ic (Pneumococcal meningitis group)

Details of the pneumococcal meningitis infections treated with diaminodiphenyl-sulphone glucoside

Case num- ber	Amount of sulphone compound given (in gms.)	Result	Days in hospital	Remarks
6 7 12 20 22 31 34	28 3 2 6 47 1½ 3	Death "" "" "" "" "" "" "" "" "" "" "" "" ""	19 1½ 1 2 49 1¼ 1¼	Improved then relapsed and died.  Improved then relapsed and died.

The pneumococcal infections were diagnosed microscopically; the presence of large numbers of Gram-positive lanceolate diplococci, generally capsulated, made identification easy. The pneumococci were isolated in all cases after primary inoculation into mice. Type pneumococcal sera were not available so that it was not possible to determine the serological type of the pneumococci isolated. Anti-pneumococcal serum for treatment purposes was much too expensive and could not be provided by either the patient or the hospital authorities. All the seven patients died so that diaminodiphenylsulphone glucoside appears to be of no value in pneumococcal infections. In two cases death was delayed to 19 and 49 days after admission. These cases improved; consciousness was regained, fever had subsided, the cerebro-spinal fluid though not completely clear was hazy, pneumococci were absent and the general condition was very much improved; both cases relapsed and pneumococci again reappeared in the cerebro-spinal fluid in enormous numbers A durin

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Meningo meningi Pneumo meningi Bacterio negative

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and death followed, one 19 days and the other 49 days after admission.

A short summary of the results obtained during the course of this trial is given below.

Table II

Summary of results obtained in the preliminary trial

	Drug-treated series				SERUM-TREATED SERIES			
	Number	Cured	Fatal	Percentage mortality	Number	Cured	Fatal	Percentage mortality
Meningococcal	12	7	5	41.7	12	3	9	75
meningitis. Pneumococcal	7		7	100				
meningitis. Bacteriologically negative cases.			••		2	2		

From table II it will be observed that there were 41.7 per cent deaths in the drug-treated series as compared with 75 per cent in the control series for the cases that were found by microscopic examination to be meningococcal infections. The percentage of deaths in the Campbell Hospital during the past three years for meningitis was between 60 to 70 per cent, so that these results suggest that the administration of diaminodiphenyl-sulphone glucoside had a beneficial effect in the treatment of meningo-

coccal meningitis.

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The experiment was next modified so that the drug-treated cases also received antimeningococcal serum. The action of sulphonamide compounds is not exactly determined. It appears, by exerting a bacteriostatic action, to keep the number of the invading organisms within manageable limits, enabling phagocytosis by the leucocytes. Branham and Rosenthal (1937), in an experimental study of sulphanilamide in meningococcus and pneumococcus infections in mice, came to the conclusion that serum combined with drug therapy gave much better results than either alone. They suga synergic action since increased effectiveness of the combined therapy was greater than the added effect of drug and serum alone. Fleming (1939), at a meeting of the section of Obstetrics and Gynæcology of the Royal Society of Medicine, said that the new chemotherapeutic agents had been shown to have rather a bacteriostatic than a bacterio-cidal action. The chief result of the drugs was interference with growth of organisms and the actual destruction of the invaders was completed by the natural defensive mechanism of the body. The defensive mechanism could be increased passively by serum therapy or actively by vaccine therapy.

In the succeeding experiment 45 cases were treated, twenty-four received anti-meningococcal

serum as well as diaminodiphenyl-sulphone glucoside orally and a second series of 21 cases anti-meningococcal serum. The details of the results obtained are given in the following tables:—

#### TABLE IIIa

Details of cases treated with diaminodiphenylsulphone glucoside and anti-meningococcal serum

Case num- ber	Amount of drug given (in gm.)	AMOUNT OF ANTI- MENINGO- COCCAL SERUM GIVEN (IN C.CM.)		Result	Days in hospital	Bacterio- logical examina- tion
35 40	24	40	160 50	Died	25	I.
41	2 38	40 150	390	0" 1	27	Nagg
42	33	130	140	Cured	37 18	Nagg Nagg
43	18	180	180	"	23	Nagg
44	18	110	160	"	8	N.G.
45	22	170	300	"	50	Nagg
48	7.5	90	90	Died	4	I
49	2.5	10	70	,,	1	N.G.
50	22	140	310	Cured	17	N.G.
51	19	150	240	"	20	ÎΙ
52	15	30	170	Died	10	I
53	30	150 115	230 180		14	N.G.
54 55	24 5	40	40	Cured Died	21 21	N.G.
57	18	122	255	Cured	16	II
58	17	100	200		14	Nagg
60	24	150	310	"	26	N.G.
61	14	80	210	",	15	N.G.
67	14	110	180	"	15	II
93	27	130	160	"	13	N.G.
94	13	110	180	"	14	Nagg
100	14	40	120	Died	12	I
102	6	40	30	Died	2	Nagg

Nagg = Meningococci isolated not agglutinable by group meningococcal sera.

Gram-negative diplococci resembling meningococci were observed, by microscopical examination, to be present in the cerebro-spinal fluid of all but two patients included in table IIIa. The two exceptions were cases 44 and 49.

From table IIIa, it is observed that of the 22 meningococcal meningitis cases six were fatal, giving a mortality rate of 27.3 per cent. Of the six that died one (case 40) received only 2.5 grammes and died within 12 hours of admission. Three others (cases 48, 55 and 102) received 7.5, 5.0 and 6.0 grammes respectively, so that very inadequate amounts of the drug had been administered to four of the six patients that died.

It is felt that diaminodiphenyl-sulphone glucoside should be administered to dangerously ill patients such as these by other routes in addition to the oral one in an endeavour to obtain quicker action. In a private communication we were informed by Dr. Buttle that the drug acts best when administered orally, and

as we lacked personal experience, we thought it advisable to continue the administration of the drug by the oral route only.

Now, however, it is felt that in desperatelyill patients the drug should be administered by other routes in addition to the oral, in an endeavour to obtain quicker action. Failure in this direction will prove a great drawback in the value of this compound in the treatment of meningitis, at least in Calcutta where most of the patients are brought for treatment when the disease is well advanced and the patient unconscious and dangerously ill. Regarding the two remaining fatalities in this group, one (case 35) appeared to be progressing favourably, the administration of the drug and serum was stopped on 19th January (13 days after admission), but the patient relapsed on the 25th and died on the 30th. He had been receiving 2 grammes diaminodiphenyl-sulphone glucoside from the 6th to the 17th January, the dose was reduced to 1 gramme on the 18th and stopped on the 19th. The readministration of serum and drug after relapse appeared to have no effect. The other (case 53) had been given 3 grammes of the drug daily from the 23rd to the 29th, the patient's condition had improved greatly, his temperature had dropped to 98°F., the cerebro-spinal fluid was almost clear and the tension reduced, though meningococci were still present in the fluid. On the 30th, the amount of drug administered was reduced to 2 grammes daily until 2nd February. During those four days, though meningococci were constantly present in the cerebro-spinal fluid, the patient's general condition was steadily improving. The drug was further reduced on the 3rd to 1 gramme daily, when the patient's temperature rose to 102°F., the cerebro-spinal fluid became turbid and teeming with meningococci, the general condition rapidly deteriorated and the patient died next morning. Anti-meningococcal serum had been given almost daily either intrathecally, intravenously or both, from the day of admission to the day of death. It appears to us that the administration of the drug in the larger doses should have been continued as long as meningococci were present in the cerebro-spinal fluid. The patient had developed no untoward symptoms of toxicity and the drug could have been continued in the larger doses until either meningococci could not be found in the cerebrospinal fluid, or toxic symptoms due to drug administration supervened.

As regards the patients that recovered, the course of the disease appeared to progress slowly towards recovery. There were no dramatic results; seriously ill patients remained so for 24 days, then slowly improved until convalescence was established. Meningococci generally could not be found by microscopic examination, in the cerebro-spinal fluid collected 36 to 48 hours after the administration of the drug, though they were found to be numerous previously.

In most of the drug-treated cases a slight rise of temperature was noticed a few days after the patients had apparently recovered and convalescence was established. Lumbar puncture was performed in a few such cases and the cerebro-spinal fluid was found to be clear and under normal pressure. There was no headache, no stiffness of the neck muscles, etc., and the patients' general condition continued to improve. In short, the patients appeared to be well, except for the slight fever. The temperature soon returned to normal when the administration of the drug was discontinued.

## TABLE IIIb (CONTROL GROUP)

Details of cases treated with polyvalent antimeningococcal serum and serving as controls for the serum-plus-drug group shown in table IIIa

Case num- ber	Amoun SERUM (IN C.	GIVEN	Result	Days in hospital	Bacteriological examination	
	IT	IV				
39	20	60	Died	19/24	C.	
46	80	110	,,	6	II	
47	70	140	,,	10	C.	
56	100	140	Cured	9	I	
62	70	140	_ ,,	10	Nagg	
63	70	140	Died .	7	II	
64	70	200	Cured	15	I	
65	30	130	Died	6 3 8	C.	
66	40	120	Cured	3	N.G.	
69	60	140 259	Curea	38	I.G.	
70 72	135	140	"	12	N.G.	
73	70	80	Died	4	C.	
74	90	160	Cured	16	N.D.	
74A	100	160	Died	8	N.G.	
79A	60	50		3	II	
59	125	260	"	16	I	
88A	50	60	"	4	II	
96	60	120	Cured	13	N. D.	
97	100	100	Died	6	C.	
98	90	180	Cured	18	N.G.	
					1	

N.D. = Not done.

Gram-negative diplococci resembling meningococci were seen to be present by microscopic examination in the cerebro-spinal fluid of all the patients included in the above series except one (case 69).

In table IIIb there are 20 meningococcal infections. Of these 12, or 60 per cent, died, all of whom, excepting one, were treated in hospital for three or more days. The minimum amount of anti-meningococcal serum administered to these cases was 110 c.cm. and the maximum 385 c.cm. while 180 c.cm. was the minimum and 385 c.cm. the maximum amount of serum administered to the cases that recovered. The administration of anti-meningococcal serum was on the whole unsatisfactory, in that a sufficient amount of it was not always available. The serum used was that prepared by a local firm. Parke Davis serum was given to a few cases when it was

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Davis Was available; later the stock was completely exhausted.

The result of this second and modified trial is summarized in table IV.

TABLE IV

A summary of the results obtained in the second and modified trial

	Drug and serum treated series				SERUM TREATED (CONTROL) SERIES			
	Number	Cured	Fatal	Percentage mortality	Number	Cured	Fatal	Percentage mortality
Meningococcal meningitis. Bacteriologically negative cases.	22	16	6	27.3	20	8	12	60

Here again the percentage mortality among 22 cases of meningitis treated with diaminodiphenyl-sulphone glucoside is very much lower than that obtaining in the control series, the respective rates being 27.3 per cent for the drugtreated series and 60 per cent for the control series. It was unfortunate that the trial could not be continued longer. The figures in each group are much too small to warrant one drawing a definite conclusion. But taking the two series as a whole it can be stated that a statistically significant reduction in the mortality rate is obtained when meningococcal meningitis is treated with the sulphone compound as compared with a similar series of cases not so treated.

The following table summarizes the result obtained in the combined series:—

Table V
A summary of the combined results obtained in both the first and second trials

	Drug treated				CONTROL SERIES			
	Number	Cured	Fatal	Mortality rate per cent	Number	Cured	Fatal	Mortality rate per cent
Meningococcal meningitis.	34	23	11	32.35	32	11	21	65.6
Pneumococcal meningitis.	7		7	100				
Bacteriologically negative cases.	2	1	1	••	3	3		••

Toxicity.—Buttle et al. (1937) report that 0.3 gramme of 4:4 diaminodiphenyl sulphone when administered in a single dose to a healthy individual caused no symptoms, but blood collected from the individual five hours later

contained methemoglobin. In a personal communication to one of us Buttle states that 3 grammes given daily for a week, with resting periods of one to two weeks, to cases of subacute endocarditis, caused considerable cyanosis and hyper-excitability. In mice, a single dose of 20 mgm. or daily doses of 10 mgm. by mouth are well tolerated by animals weighing 20 grammes but produced symptoms of hyper-excitability in four to five days.

In this experiment, spectroscopic examination of the blood of the patient's receiving diaminodiphenyl-sulphone glucoside showed generally, methæmoglobin begins to appear when the condition of the patient improves and the cerebro-spinal fluid becomes clear or almost clear. As long as the fluid was turbid the administration of even 25 grammes (100 tablets) during the course of ten days did not produce methæmoglobin. On the other hand, the administration of only 7.5 grammes (30 tablets) during the course of three days produced methæmoglobin bands faintly when the cerebrospinal fluid was clear.

In no instance were sulphæmoglobin bands observed, denoting that this drug is evidently not so easily decomposed in the body under the conditions of this experiment.

On the appearance of methæmoglobin in the blood the amount of drug administered was reduced or stopped, and no clinical evidence of methæmoglobinæmia or cyanosis was observed in such cases.

In one case, where the administration of the sulphone compound was continued for eight days after the appearance of methæmoglobin a distinct blue discoloration of the nails and shallow hurried breathing was observed. The administration of the drug was stopped and the symptoms immediately cleared up.

The spectroscopic examination of the blood was carried out in collaboration with Mr. P. K. Seshan, M.sc., and the detailed result is being published as a separate paper which follows this one.

Treatment with Cepticide.—When the stock of diaminodiphenyl was running out, a supply of drug named cepticide, manufactured locally, was received for trial and a few cases were treated on similar lines except that cepticide in doses of 3 grammes per day was given instead of the sulphone compound. Cepticide is the trade name of amino-benzene sulphonamidepara, manufactured by the Lister Antiseptics & Dressings Co. It is in tablet form, each tablet containing 0.5 gramme. Two tablets were administered orally three times a day in addition to anti-meningococcal serum. The results obtained are given in table VI.

Gram-negative diplococci resembling meningococci were found by microscopic examination to be present in the cerebro-spinal fluid of all excepting three patients included in the above table. The three exceptions (nos. 77, 86 and 89) proved to be cases of pneumococcal meningitis. TABLE VI

The results obtained by the treatment of meningococcal and pneumococcal infections with cepticide and anti-meningococcal serum

Case num-	Amount of cepti- cide	cepti- (IN C.CM.)		Result	Days in hos-	Bacterio- logical examination	
ber	given (in gm.)	IT	IV		pital		
75 76 77 78 79 80 82 84 85 86 87 88	21 12 25.5 2 3 18 6 15.5 18 12 15 21 6	100 60  10 35 70 30 30 40  60 70	140 80  30 60 140 60 80 120  145 140	Cured Died	13 5 22 1 2 3 8 4 18 20 12 14 29 2	I. C. Pneumococcal meningitis. Nagg. C. II. N. G. N. G. Nagg. Pneumococcal meningitis. N. G. C. Pneumococcal meningitis.	

Of the 13 patients treated with cepticide, ten were meningococcic meningitis infections. The percentage of deaths among these ten was 40 per cent. There were no toxic nor any other untoward symptoms attributable to the drug in any of the 13 cases. Three were pneumococcal

infections two of which proved fatal.

Hewell and Mitchell (1939) report that three pneumococcal meningitis recovered when treated with sulphanilamide and related compounds, whereas the mortality rate was 100 per cent among 23 cases treated during 10 years prior to the introduction of these chemotherapeutic drugs. During the course of this investigation, among 91 cases of meningitis bacteriologically examined, ten were found to be pneumococcal infections. All the ten cases were treated with chemotherapeutic drugs (seven with the diamino compound and three with cepticide) and none of them received anti-pneumococcal serum. Nine of these ten died so that one at least of the two drugs used had no beneficial action in the treatment of this disease under the conditions of the experiment employed.

There are obviously a fair number of cases of pneumococcal meningitis admitted to the Campbell Hospital. We are not aware if these were diagnosed previously, but we would recommend that provision of anti-pneumococcal serum be made for the treatment of these cases. The introduction of M. & B. 693, which is said to be almost specific for certain pneumococcal infections, may provide a valuable and relatively cheap mode of treatment, nevertheless it is felt that even with M. & B. 693, anti-pneumococcal serum will be required and should be provided.

Bacteriological examination.—Cerebro-spinal fluid from 91 cases admitted to the meningitis ward was examined bacteriologically. A 37°C. incubator was kept in the ward in which tubes containing 1 per cent pigeon-blood agar were placed a day previous to being used. These tubes were inoculated directly at the bedside when lumbar puncture was done. About 10 drops of cerebro-spinal fluid was allowed to fall into the pigeon-blood-agar tubes after allowing the first few drops to drain away. The were immediately replaced in the incubator. More cerebro-spinal fluid was caught in sterile test-tubes. A portion of the fluid was centrifuged and the deposit examined microscopically and seeded on to another pigeonblood-agar slope.

Microscopical examination was done by making films of the deposit and staining

according to Gram's method.

By microscopic examination ten were found to be pneumococcal infections, 76 showed Gramnegative diplococci resembling meningococci, and five showed no organisms and no pus cells. Pneumococci were isolated from all the ten cases by inoculating 1 c.cm. of the cerebro-spinal fluid intraperitoneally into a mouse and recovering the organism from the heart blood, when the inoculated animals died next morning.

The isolation of meningococci proved more difficult. In only 39 of the 76 cases were meningococci isolated; 15 were contaminated and two were not cultured so that meningococci were isolated from 39 out of 59 cases (66 per cent). The inoculated tubes were examined daily for four days. Those showing a growth were stained by Gram's method and verified to be Gram-negative diplococci; they were next inoculated into serum water, containing either lactose, glucose, maltose or saccharose and an indicator; all the 39 behaved like meningococci in that they fermented glucose and maltose. The agglutination test was next done employing groups I and II meningococcal agglutinating serum obtained from Dr. Gardner of the Standards Laboratory, Oxford. The most frequent contaminants were Staphylococcus albus and Niesseria catarrhalis; two or more contaminating organisms were usually present summarizes together. The following

acteriological findings:—	
Total number of cases examined culturally	89
Number of cases in which the cerebro-	00
spinal fluid showed no growth on	
pigeon-blood_agar	25
Number of cases in which pneumococci	10
were isolated Number of cases in which meningococci	10
were isolated:—	
Group I meningococci 18	
" II " 10	
Meningococci not agglutinable 11	20
Number of cases in which the couches	39
Number of cases in which the cerebro- spinal fluid proved to be grossly	
contaminated	15
	10

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SPECTROPHOTOMETRIC EXAMINATION OF BLOOD IN THE TREATMENT OF MENINGITIS WITH DIAMINODIPHE-NYL-SULPHONE GLUCOSIDE

By R. N. CHOPRA, c.i.e., M.A., M.D., Sc.D. (Cantab.), F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S. (Retd.) P. K. SESHAN, M.Sc., A.I.C.

and

A. J. H. deMONTE, pp.Bact., I.M.D.

(From the School of Tropical Medicine, Calcutta)

Among the modern triumphs of chemotherapeutic researches, the administration of sulphanilamide and several other derivatives of aromatic compounds containing both sulphur and amino groups for streptococcal infection is the most striking. Because of the great efficiency of the drug there has sometimes been uncontrolled administration in large doses which has produced toxic symptoms. In several cases marked cyanosis has occurred, which is one of the clinical symptoms of toxicity. The cyanosis following the adminis-

## (Continued from previous page)

#### Summary

1. The mortality rate among 34 cases of meningococcal meningitis treated with diaminodiphenyl-sulphone glucoside, either alone or together with anti-meningococcal serum, was 32.35 per cent.

The mortality rate in similar series of 32 cases treated with anti-meningococcal serum alone

was 60 per cent.

2. The mortality rate was 41.7 per cent when 12 meningococcal meningitis cases were treated with the sulphone compound without administration of anti-meningococcal serum and fell to 27.3 per cent in a second series of 22 meningococcal cases treated with both anti-meningococcal serum and drug. The rate for a corresponding series of cases treated with antimeningococcal serum was 75 per cent and 60 per cent, among 12 and 20 cases.

3. Diaminodiphenyl-sulphone glucoside, under the conditions of this experiment, appears to be of little value in the treatment of pneumococcal

meningitis.

4. Čepticide was administered to ten meningococcal and three pneumococcal meningitis cases. The drug was non-toxic in the doses employed. The mortality rate in the cepticide series was 40 per cent, while that obtaining in the control series was 60 per cent. The number is too small to warrant the drawing of conclusions.

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tration of prontosil has been recently found to be due to the appearance of methæmoglobinæmia or sulphæmoglobinæmia or both in the blood. Brownlee (1939) has observed that the presence of aromatic amino groups causes derangement of the pigment metabolism and produces the toxic symptoms which often follow the administration of drugs containing the amino

Spectroscopic examination of the blood of patients provides an efficient technique for the study of the mechanism of cyanosis, and helps to identify the various pigments present in the blood. Discombe (1937), Paton and Eaton (1937) and others have studied the appearance of methæmoglobinæmia and sulphæmoglobinæmia in patients receiving sulphanilamide orally with and without magnesium sulphate or hydrochloric acid. They have recorded that the spectroscopic examination was the most sensitive and reliable method of diagnosis. Colebrook and Kenny (1936), and Colebrook and Purdie (1937) in a study of the treatment of puerperal fever by sulphanilamide examined the absorption spectra of the blood of 60 cyanosed patients and found 24 cases of sulphæmoglobinæmia, 13 cases of methæmoglobinæmia and 8 cases of both. Recently, Welb and Kniakzuk (1939) have made a spectrophotometric examination of the blood of rats receiving sulphanilamide and have observed methæmoglobin and sulphæmoglobin in the blood after its prolonged administration. Several other workers have recorded that the spectroscopic examination of the blood was several times more sensitive than the clinical diagnosis, and alone was able to decide whether the cyanosis was due to methæmoglobin, sulphæmoglobin or both, or to some other pigments. Such an observation is extremely important in researches on chemotherapeutic studies of organic compounds, as the formation of sulphæmoglobin may be due to the reaction of the decomposition products of the drug in the blood. Sulphæmoglobin being a more stable derivative of hæmoglobin is eliminated from the system only slowly and with difficulty.

We have been carrying out investigations on the chemotherapy of diaminodiphenyl-sulphone glucoside for meningococcal infection in patients admitted in the Campbell Hospital, Calcutta. Buttle and co-workers (1937) have observed in animal experiments the presence of methæmoglobin in the blood after the administration of the drug. The opportunity for using the spectroscopic examination of the blood was utilized for controlling the administration of the drug and stopping it as soon as the methæmoglobin absorption band was observed. In this paper some of the observations on the appearance of the absorption bands of the blood are discussed.

It is well known that each of the hæmoglobin. derivatives has a specific absorption spectrum in the visible region which helps considerably

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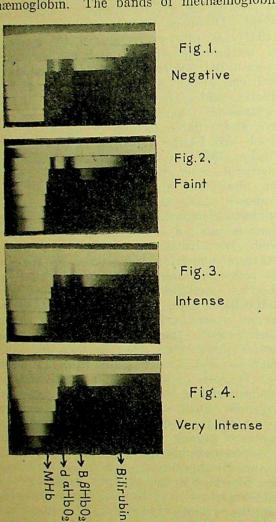
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in the identification and estimation. Oxyhemoglobin has bands, known as a and  $\beta$ , at 570  $m\mu$  and 530  $m\mu$  while that of carboxy hemoglobin are at 560  $m\mu$  and 525  $m\mu$ . The difference in the position of the absorption bands are used for the detection of carbon-monoxide poisoning. The distance between the two bands is known as the 'span'. Measurements of the intensity of the absorption at 540  $m\mu$  of the blood solution after the addition of  $K_3Fe$  (CN)<sub>6</sub> and KCN are used by Drabkin and Austin (1935) for the spectrophotometric estimation of hemoglobin. The bands of methemoglobin



and sulphæmoglobin are on the longer wavelength of  $600~m\mu$  while that of oxy, carboxy, cyano derivatives of hæmoglobin are on the shorter wave-lengths of  $600~m\mu$ . Sulphæmoglobin has an absorption band between  $615~m\mu$  and  $625~m\mu$  with a maximum at  $620~m\mu$ , while that of methæmoglobin is between  $625~m\mu$  and  $635~m\mu$  with a maximum at  $630~m\mu$ . Moreover on addition of a drop of ammonium sulphide or ammonia to the solution, the band at  $630~m\mu$  due to methæmoglobin disappears, and the band at  $620~m\mu$  of sulphæmoglobin persists. This is used as a very sensitive test for differentiating between these two derivatives.

In all the experiments 0.2 c.em. of the oxalated blood were taken, and the erythro-

evtes washed with saline (isotonic) solution twice, and centrifuged. The erythrocytes were hamolysed by the addition of 10 c.cm. of distilled water and again centrifuged. The clear solution was poured into a Baly's absorption tube where the length of the absorbing column could be altered from 1 mm. to 100 mm. The absorption bands were observed through a direct-vision spectroscope and photographed on a panchromatic plate with a Zeiss spectrograph of dispersion 90 A per mm. at 520  $m\mu$ . A tungsten-filament lamp with quartz window taking 6 amps. (Zeiss) served as the source of light in the visible region. If the absorption bands at 630 mµ could be observed with a 40 mm. column it was marked as very intense, 60 mm. as intense, and 80 mm. as faint. If it could be observed only with a 100 mm. column it was marked as very faint and if it could not be observed even with a 100 mm. as negative. This gives a rough indication of the quantity of the pigments contained therein. In every case a drop of ammonium sulphide was added to observe the behaviour of the band at 630  $m\mu$ . In all cases the band disappeared completely, indicating that it was due to methemoglobin and not to sulphæmoglobin. In figures 1 to 4 are given photographs of the absorption bands exhibiting negative, faint, intense and very intense bands of methæmoglobin.

In the following table the observation of methemoglobin in the blood of patients with meningitis treated with the diaminodiphenyl-sulphone glucoside (oral administration in the form of tablets 0.25 gr. each) are given. Only one case was pneumococcal and the rest were all meningococcal. The appearance of the cerebro-spinal fluid is given to indicate the progress of the treatment. The total amount of the drug (the number of tablets) consumed on the date marked is also given along with the daily dose.

From the study of the table it will be seen that the methæmoglobin band appears in some cases after as few as 28 tablets (7 gm.) while in others it is absent even after 100 tablets (25 gm.). The patients were all of medium stature and physique and of average weight.

A very striking observation is that usually the methemoglobin appears in the body only after the cerebro-spinal fluid becomes clear. As long as the fluid is turbid the administration of even 100 tablets (25 gm.) does not produce methemoglobin. In case 9 even though 132 tablets (33 gm.) were administered the methemoglobin band was only faint, the condition of the fluid being still hazy. On the other hand the administration of 30 tablets (7.5 gm.) had produced the appearance of the methemoglobin band faintly in cases where the cerebro-spinal fluid was clear. Thus, it seems that the toxic symptoms begin to appear only after the infection has been removed. In none of the cases was the presence of sulphemoglobin

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observed showing that this drug is evidently not so easily decomposed in the system.

Since in almost every case the administration of the drug was stopped when the spectroscopic examination revealed the presence of methæmoglobin, none of the patients developed cyanosis or any other toxic symptoms. Since the drug treatment was stopped and the

patients were discharged soon after the fluid was clear, it was not possible to observe the time taken for the complete disappearance of methæmoglobin, or the appearance of cyanosis if the treatment had been continued. In one case it was observed that the blood showed no methæmoglobin band the day following the stoppage of the drug though it had been present

TABLE

		100	ABLE				
Serial number	Particulars of patients	Date	Daily total	Number of drug tablets given	Appearance of C. S. F.	Intensity of MHb band	Remarks
. 1	N. K., 30, H. M.*	15-11-38 16-11-38 17-11-38 18-11-38 19-11-38 20-11-38 21-11-38	4 8 8 8 8 	4 12 20 28 36 36 36	Turbid " Sl. "turbid Hazy Clear	Negative "V. faint Negative "	Stopped. Discharged.
2	В., 28, Н. М.	16-11-38 17-11-38 18-11-38	0 4 8	0 4 12	Turbid	Negative	Died.
3	R., 30, H. M.	17-11-38 18-11-38 19-11-38 20-11-38 21-11-38 22-11-38	12 12 12 12 12 4 4	20 32 44 48 52 56	Turbid Sl. turbid Clearer Clear	Negative V. faint Faint Intense V. intense Intense	Reduced.
4	B. S., 22, H. M.	23-11-38 24-11-38 25-11-38 26-11-38 27-11-38 28-11-38	12 12 12 12 12 12 12	32 44 56 68 80 92	Turbid Sl. turbid Hazy Clear	Negative " V. faint Faint Intense	Stopped.
5	D. D. C., 22, H. M.	23-11-38 24-11-38 25-11-38 26-11-38 27-11-38 28-11-38	12 8 8 8 8 8	28 40 48 56 64 72	Turbid Sl. turbid "Clear	Negative " V. faint Faint	Stopped.
6	R. R., 18, H. M.	8-12-38 9-12-38 10-12-38 12-12-38 14-12-38 15-12-38	8 8 8 8 8	32 40 48 64 80 88	Turbid " " " " " "	Negative V. V. faint V. faint Faint	Died.
7	N. S., 26, H. M.	12-12-38 14-12-38 15-12-38	12 12 12	14 38 50	Turbid	Negative Intense V. intense	Died.
8	A. C. C., 20, H. M.	21-1-39 24-1-39	12	48 84	Turbid	Negative	
9	А., 30, Н. М.	21-1-39 24-1-39	12 12	96 132	Sl. turbid Hazy	V. faint Faint	
10	B. S., 25, H. M.	21-1-39 24-1-39	12	84 110	Turbid	Negative V. intense	Stopped.
11	R. D., 24, H. M.	21-1-39 24-1-39	8	156 70	Clear	Negative V. faint	Discharged.
12 °	K. M., 25, H. M.	21-1-39 24-1-39	4	52 64	Turbid	V. faint Intense	Stopped.

<sup>\*</sup>H. M. = Hindu male. V. = very. The particulars of the patient given are, initials, age, religion and sex. (Continued at foot of next page)

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# DIFFERENT SEROLOGICAL RACES OF LEPTOSPIRA IN THE ANDAMANS

By B. M. DAS GUPTA

(From the Department of Protozoology, School of Tropical Medicine, Calcutta)

THE materials on which this investigation is based were received through the courtesy of Major B. Chaudhuri, I.M.S., senior medical officer, the Andaman and Nicobar Islands, and

(Continued from previous page) faintly the day previous. In another case where the administration of the sulphone compound was continued for eight days after appearance of the methæmoglobin band a distinct blue discoloration of the nails and shallow hurried breathing was noted. The administration of the drug was immediately

The high sensitivity and reliability of this type of spectroscopic diagnosis of methæmoglobinæmia for controlling the administration of sulphur and amino derivatives of aromatic

compounds has to be recorded.

It is a pleasure to record our thanks to Dr. G. Sankaran, professor of biochemistry and nutrition of the All-India Institute of Hygiene and Public Health, for helpful suggestions and facilities afforded for the investigation. Most of the expenses for this investigation were defrayed from grants from the Endowment Fund of the Calcutta School of Tropical Medicine.

#### Summary

The appearance of the absorption band at 630  $m\mu$  and its behaviour on addition of ammonium sulphide are used as a very sensitive method for detecting the presence of methæmoglobin and sulphæmoglobin in blood.

It is observed that on administration of diaminodiphenyl-sulphone glucoside for meningococcal infection no sulphæmoglobinæmia is

produced.

It is also observed that generally methæmoglobin begins to appear on the administration of the drug only after the cerebro-spinal

fluid becomes clear.

When the administration of the drug is stopped after the appearance of the methæmoglobin band in the blood, no toxic effects are produced.

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Dr. H. D'Silva, senior assistant surgeon, Port Blair. They consisted of blood cultures on Fletcher's or Vervoort's medium and sera from cases of leptospirosis which occurred in this settlement from August 1938 to April 1939. The specimens which were unsuitable for examination or failed to show significant evidence of leptospiral infection have been left. out of account.

As it was shown by Taylor and Goyle (1931), who have carried out a comprehensive and highly efficient investigation into leptospirosis in the Andamans, that there exist in these islands two distinct serological groups, e.g., CH 11 and CH 31, it has been our object to determine to which of these groups the five strains isolated in the settlement during the above period belong. Accordingly anti-sera were prepared against the two strains referred to above by injecting rabbits with rich living cultures in Vervoort's medium. Usually eight injections were necessary for the production of a high-titre agglutinating serum. The immunized rabbits were bled a week or ten days after the last injection and the sera gave a titre of 1:10,000 in both the cases. As one of the strains was not agglutinated by either of the anti-sera it was sent to the Schüffner Laboratory at Amsterdam for the purpose of further investigation, with a view to determining its true serological character.

All the sera obtained on different days of illness were first tested against the two established Andamans strains (CH 11 and CH 31). The specimens which did not yield any definite reaction with the above strains were also sent to Prof. Schüffner for testing against the representatives of several other serological

groups.

TABLE I Serological grouping of the strains

	Strains						
Anti-sera (1 : 10,000)	Jamsher*	Mg. Tin Tin *	Potin	Sherkhan	No. 4		
Andamans CH 11 Andamans CH 31 Moscou V Rachmat Rat (Semarang 173) H. Utrecht IV (L. canicala).	10,000 10,000	100	10,000	10,000	20 10,000 		
Vleermuis 90C Hebdomadis Sarmin Chopra (L. ictero- hæmorrhagiæ).	•••	10,000 100 100		40			
Kantorwicz (L. icter.) Wijnberg (L. icter.)	100	1,000 300		*.			

Tests were carried out at the Schüffner Laboratory at Amsterdam. Moscou V = Andamans CH 31.

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TABLE II

Sera showing agglutinative action either on Andamans CH 11 or Andamans CH 31

	STRAINS					
Number of specimens	CH 11	CH 31				
74		+1: 160*				
2 2 3	+1:20	+1: 160*				
2	+1:160*	+1: 20				
3	+1:160*					
1	+1:30	+1:10,000				
1	+1:10	+1:3,000				
î	+1:30	+1:300				

\* Higher dilutions not tried.

TABLE III

Sera showing high degree of agglutination with strains other than CH 11 and CH 31

Sera	L. icter.	L. canicol.	CH 11	CH 31	Semarang 173	30C	Rachmat
Convict no. 7549 Serum no. 1 Serum no. 29 Marquas Beg Punnu Swamy	300 100 10,000 10,000 100	300 300 100 1,000	10 10 10 30	100 100 100 10	••	1,000 3,000  3,000	••

It will be obvious from table I that, out of the five strains isolated, four belong to the same serological group as Andamans CH 31, the remaining one being identical with a Java bat strain (90 C). It should be mentioned here that, according to Prof. Schüffner who is responsible for typing this last-named strain, this is the first time that this type has been recovered from a human case. The sera listed in table II yielded significant positive agglutinations, chiefly with the Andamans CH 31. A few, however, agglutinated Andamans CH 11. It may be recalled that in 1931 Taylor and Goyle noted that out of twenty-eight strains studied by them only four were agglutinated by CH 31 anti-serum and all the rest belonged to the same group as CH 11. Table III shows that three specimens of sera react with 90 C in high dilutions, although a certain amount of co-agglutination was found with some other strains. Two specimens agglutinated the classical strain (L. icterohæmorrhagiae) in a very high dilution (1:10,000), thus showing that the organism belonging to the icterohæmorrhagiæ group also exists in the settlement, though its occurrence appears to be the least common.

Summary

There exist in the Andamans two other serological types of leptospira (Java bat type '90 C' and the classical L. icterohæmorrhagiæ (Continued at foot of next column)

## TAKING BLOOD FOR TRANSFUSION

By S. D. S. GREVAL LIEUTENANT-COLONEL, I.M.S.

and S. N. CHANDRA

CAPTAIN (late 1.M.S.)
Imperial Serologist's Laboratory, School of Tropical
Medicine, Calcutta

Complaints are often received from donors of blood, who go out to serve through this laboratory, regarding incisions, large or small, made over a vein, and regarding pain caused by needles of large bore. Comments are also heard regarding the way the blood is exposed during collection. This communication is published with a view to helping those unfamiliar with a less painful and more aseptic technique and thereby adding to the ease and safety of blood transfusion. In it (i) the taking of blood in a solution of sodium citrate, and (ii) defects in the sodium citrate solution will be dealt with.

## I. Taking of blood in a closed system, under negative pressure, into a solution of 2.5 per cent sodium citrate

Potain's aspirator supplies the system and is too well known to need description. All the parts, except the pump, are sterilized and assembled with aseptic precautions. Into the bottle is put 2.5 per cent sterile sodium citrate solution, 1/10th volume of the intended total. Into the free end of the rubber tube connected with the inlet in the special stopper is inserted a needle from a 20 c.cm. record syringe, with or without adapter. The rubber tube, connected with the exhaust in the special stopper, is knotted upon itself to form two loose knots in its course in order to prevent contamination of the contents of the bottle with micro-organisms, which may be blown in from the pump with the back stroke of the piston.

About 20 strokes of the pump, held and worked by an assistant, suffice to produce the necessary vacuum.

The needle is introduced into a suitable vein in the arm, after the former has been made

(Continued from previous column)

type) besides those already noted by Taylor and Goyle. Andamans B type (CH 31) appears to be responsible for the infection in a large majority of cases during the period of our investigation.

We wish to express our indebtedness to Major B. Chaudhuri, M.B.E., I.M.S., and to Dr. D'Silva, I.M.D., for supplying the materials on which this work is based. We would also record our grateful appreciation of the valuable assistance rendered by Prof. Schüffner and his staff.

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prominent with a tourniquet which does not stop the pulse. No local anæsthesia is necessary. The stopcock connecting the inlet with the bottle is opened. A steady flow of blood results. The bottle is briskly moved (by the assistant who works the pump) with a circular motion, clock-wise and then counter-clock-wise, to mix the blood with the citrate solution. A few more strokes of the pump and readjustment of the

The actual quantities of the citrate solution relative to the total contents of the bottle are: 40 e.em. for 360 e.em. of blood, total 400 e.em.; 30 e.em. for 270 e.em. of blood, total 300 e.em.; 20 c.cm. for 180 c.cm. of blood, total 200 c.cm.; and 10 c.cm. for 90 c.cm. of blood, total

100 c.cm.

Ordinary glass stoppered bottles into which the special rubber stopper fits can be used. Marks to indicate quantities are etched or

scratched on them.

After taking the required quantity of blood the inlet is closed. Negative pressure is abolished by admitting air slowly through the knotted tube (hissing sound is avoided). The special stopper is removed and replaced by an ordinary sterilized glass stopper which, together with a part of the neck of the bottle, is wrapped round with sterile cotton-wool, gauze or a paper cap (made by moulding two layers of paper over the stopper and the neck of the bottle which it fits). A sterilized and paraffined cork can be used instead of a glass stopper. The bottle is now ready to be passed on to the operator responsible for the

The special stopper of the aspirator is placed in running water as soon as it is disengaged, to

free it from blood.

From the bottle of citrated blood, transfusion can be given by a closed system (in a bacteriological sense) by means of a rubber tube and a two-way 20 c.cm. record syringe. The rubber tube is secured in the neck of the bottle with a packing of sterile cotton-wool or gauze (kept dry). An ordinary syringe can be made into a two-way syringe by an adapter (cost Rs. 4). Over the free end of the rubber tube in the bottle are tied two layers of fine muslin of good quality (free from loose fibres) to filter out coagula that might have formed before the mixture of the blood with the citrate solution became uniform.

It is considered that for giving citrated blood the usefulness of the improvisation described almost equals that of the apparatus specially designed, including the recently described rotary pump (Riddell, 1939). Potain's aspirator is available in most small dispensaries, far below the class of a district hospital, in India. The parts, of which more than one may be required, are cheap (a spare special stopper cost in Calcutta, Rs. 12 on 3rd October, 1939).

Incidentally, blood letting for other purposes can also be done neatly and quickly by the use

of the same device, sterility being limited to the needle (and to the rubber tube carrying it if no adapter is used) and citrate solution being

# II. Defects in sodium citrate solution

The opinion has steadily gained ground that the 'reactions' attributed to sodium citrate are really due either to incompatibilities of bloods, impurities in the distilled water used, or

impurities in the salt itself.

Încompatibilities of bloods have been described by the writers, at length, in a recent communication (Greval and Chandra, 1939). The facts not yet generally recognized are: (i) all group-O subjects are not universal donors, (ii) there are slowly-reacting red cells of group A, (iii) all donors will not suit a group-AB recipient, (iv) a donor may not be compatible for a repeated transfusion, (v) a naturally occurring anti-M substance may be present in the donor or the recipient as an abnormality, and (vi) substances other than isohæmagglutinogens A and B or hæmagglutinogens M and N may be responsible for incompatibility. Donor and recipient must belong to the same group and direct matching must be done. Recipients AB must be transfused from safe donors of other groups if donors AB are not available. In emergencies when grouping is not possible only safe group-O donors should be used.

For excluding impurities in water only distilled water from a reliable still should be

used.

For excluding impurities in the salt heed should be paid to its chemistry rather than its price. It is surprising how many defects may exist in this simple salt. According to the British Pharmacopæia (1932) they consist of (i) undue alkalinity or acidity, (ii) tartrates, (iii) oxalates, (iv) sodium chloride, (v) sulphates, (vi) arsenic and (vii) lead. The purity of the salt is specially stressed because of the present shortage of its supply from certain sources. The shortage is likely to increase in the near future.

The writers sterilize their 2.5 per cent solution in a steamer, at atmospheric pressure, for 25 minutes daily, on three consecutive days, usually in quantities given above, in bottles into which the special stopper fits but which are plugged with cotton-wool. Glass stoppers (fitting the bottles) loosely wrapped in paper caps are sterilized at the same time. After sterilization is complete, the cotton plugs are replaced by glass stoppers and paper caps. The bottles are stored in a dust-free receptacle until required. The solution is also sterilized and kept in large test tubes left in an air-tight glass jar. It is poured into an empty sterile bottle when needed.

Highly concentrated sterile sodium citrate solution is put up in ampoules by commercial

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ELECTROCARDIOGRAPHY THE IN HEART SILENT DIAGNOSIS OF DISEASES

> By N. R. KONAR, M.B., B.M.S. (Upper) Senior House Physician

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THE diagnosis of heart disease is often made more or less accurately by careful history taking and a thorough physical examination. The usual symptoms suggestive of cardiac dysfunction are breathlessness on accustomed exertion, precordial pain, palpitation, and syncope. Their presence, however, is not always pathognomonic of heart disease. Breathlessness on exertion may be present in obesity, emphysema, pulmonary and mediastinal neoplasms, and neuro-circulatory asthenia. Besides, some patients may not be actually conscious of its presence while others (particularly women) may exaggerate it. Thus, it is sometimes difficult to evaluate this symptom.

Precordial pain that is not strictly retrosternal and definitely related to effort may be due to neuro-circulatory asthenia, intercostal panniculitis and fibrositis, gastric and cholecystic disturbances and other causes not related

(Continued from previous page)

firms. Directions regarding quantities are supplied with the ampoules. The writers have no

experience of the solution.

In the maximum volume for transfusion, 400 c.cm. for an adult, recommended by the writers, the total quantity of the sodium citrate injected into the recipient is what is contained in 40 c.cm. of a 2.5 per cent solution, i.e., grammes = 1 gramme. Even if the volume were doubled the quantity would only be 2 grammes which is much below the limit of 5 grammes allowed by Lewisohn (Wiener, 1935) who studied in detail the citrating of blood for transfusion.

#### Summary

1. Potain's aspirator can be used in taking blood for transfusion. It can also be used, incidentally, in blood letting.

2. Many defects can exist in sodium citrate. The pure salt under a certain quantity is quite safe for use in citrating blood for transfusion.

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Greval, S. D. S., and Chandra, S. N. (1939). Indian Med. Gaz., Vol. LXXIV, p. 461.
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Wiener, A. S. (1935). Blood Groups and Blood Transfusion. Baillière, Tindall and Cox, London (p. 62).

to the heart. Palpitation alone is unreliable as a symptom of heart disease. It is the manifestation of a rapid, forcible or irregular action. Digestive disturbances patient's own sensitivity are often important factors in the production of this symptom. However, it must be remembered that the sudden onset of palpitation on accustomed exertion in middle-aged persons is usually significant of cardiac disease. Syncope is more often a symptom of an unstable vasomotor centre associated with increased vagal tone than of cardiac disease, though it is true that complete or partial heart block, paroxysmal tachycardia, and arotic incompetence may at times be responsible for the symptom.

The usual physical signs indicative of heart disease are cardiac enlargement, alteration of heart sounds, organic murmurs, serious irregularities of rhythm and evidence of cardiac failure. There are cases, however, where the elicitation of some or all of these signs is very difficult, if not impossible. The estimation of the size of the heart in an obese or emphysematous individual is almost impossible. The heart sounds may also be muffled in such subjects. In other cases, as in effort angina, the physical signs are vague and indefinite.

We propose to include under the designation of silent heart diseases all those cases which do not show the usual signs and symptoms of cardiac trouble when they first come under observation, but in which later on strenuous situations or sudden cardiac catastrophes make the disease too apparent. Recognition of the disease in the silent phase will prevent many a calamity of advanced cardiac lesion. Undoubtedly, the electrocardiograph can play an important rôle in the early recognition of such potentially dangerous cardiac disorders.

The so-called silent disorders of the heart may be considered under two groups, (a) toxic and infective, and (b) degenerative.

The chief feature of all these groups is myocardial dysfunction or damage. For an accurate assessment of the myocardial condition electro-cardiographic examination is as essential as auscultation in the detection of valvular lesions. But the functional or structural changes in the myocardium would often produce similar types of abnormal waves in the electrocardiogram, and thus present difficulties in their proper interpretation, unless the history and the age of the patient are taken into consideration and subsequent follow-up electrocardiograms are taken at suitable intervals. Reversible changes (those due to toxins, drugs, or anemia) may thus be differentiated from irreversible changes (necrosis and progressive fibrosis due to gradual ischæmia).

# (a) Toxic and infective groups

Toxamia of acute infections. In acute infectious diseases such as diphtheria, pneumonia,

typhoid fever and influenza there is diffuse cardiac damage consisting of hyaline changes, fatty degeneration, fragmentation of the muscle fibres and occasionally of small hæmorrhages. The myocardial condition cannot in many cases be judged clinically because definite signs and symptoms are often lacking. On the other hand, symptoms of myocardial weakness may be present, as during convalescence from influenza, although they are really due to neuro-circulatory asthenia. For these reasons, electrocardiographic studies are very helpful in detecting the presence of actual myocardial involvement. Diffuse myocarditis, grades of partial heart block, complete heart block, bundle branch block or arborization block may all be detected from the electrocardiogram in otherwise unsuspected cases.

The electrocardiographic abnormalities consist of low-voltage waves in all the leads, flattened iso-electric or inverted T waves, especially in leads I and II, prolongation of the P-R interval beyond the normal limit of 0.2 second, with or without a dropped ventricular complex, and notching of the QRS complex with widening beyond the normal limit of 0.1 second. In this connection it must be emphasized that too much importance should not be attached to low voltage alone in the diagnosis of myocardial damage, because it is a transient change and its absence does not exclude the possibility of myocardial damage. demonstrating Electrocardiographic tracings, myocardial damage in the course of acute infections, are shown in figures 1 to 3.

Fig. 1.—This is an electrocardiogram taken on the 15th day of illness in the case of a girl aged 6 years, admitted to hospital with diphtheria on the 8th day of the disease. Physical examination did not reveal any abnormality of the heart. Heart rate, 109 per minute; rhythm regular; P-R interval 0.2 second; T and P waves superimposed; QRS complex thickened and notched in all leads and its duration prolonged to 0.12 second. There is left axis deviation; the ST segment is depressed in leads I and II and ice electric segment is depressed in leads I and II and iso-electric in lead III. These changes are indicative of left bundle branch block

Fig. 2.—This is the electrocardiogram of a patient, aged 18 years, taken while he was convalescing from influenza. He came in with a history of continuous fever for seven days associated with intense headache, fever for seven days associated with intense headache, marked generalized pain all over the body, frequent vomiting, and catarrh of the upper respiratory tract. The electrocardiogram was taken on the 8th day of convalescence. On physical examination, no abnormality was detected in the cardiovascular system except a low blood pressure, 90/60 mm. of Hg. Sinus mechanism normal; heart rate 68 per minute; rhythm regular; P pronounced in leads II and III; P-R interval 0.22 (delayed conduction); Q prominent in lead III; right axis deviation; QRS complex markedly notched in lead III; T wave diphasic in lead III; ST segment elevated. The above changes suggest toxic myocarditis.

Fig. 3.—Electrocardiogram of a man aged 26 years suffering from typhoid fever of 14 days' duration. The heart was normal in size, but the first sound was faint. The pulse was regular with a rate of 100 per minute. Blood pressure was 100/60 mm. of Hg. Urine examination showed a trace of albumin and a few pus cells. The electrocardiogram shows a picture of diffuse toxic myocarditis. QRS complexes thickened and of poor voltage in all leads; T waves flattened in leads I and

II and iso-electric in lead III; ST segment slightly elevated in lead I.

Toxamia due to focal sepsis.—Long continued absorption of toxins from various septic foci such as tonsils, teeth, nasal sinuses, diseased gall-bladder and prostate may not only aggravate pre-existing heart disease, but may also give rise to cardiac disturbances in apparently healthy individuals. It is often difficult to ascertain clinically how far the cardiac symptoms are purely functional in nature and how far they are due to an underlying myocardial lesion.

Fig. 4.—Electrocardiogram of a man, aged 38 years, who gave a history of recurrent attacks of maxillary sinusitis. Clinical examination did not reveal any abnormality in the heart; heart rate 93 per minute; rhythm regular; QRS complexes notched and splintered, timing 0.11 second (prolonged); T waves in leads I and II flattened and iso-electric in lead III. This picture is indicative of myocarditis with delayed intraventricular conduction.

Thyrotoxicosis.—Apart from acceleration of the heart beat due to increased basal metabolism, thyroxin appears to act directly upon the myocardium causing tachycardia and even auricular flutter and fibrillation. Histopathological changes in the heart are difficult to demonstrate, but occasionally patchy degeneration, round-cell infilteration, and fibrosis may occur. Electrocardiogram shows very often unusually large P waves, high T waves, depression of ST segments or inversion of T waves, particularly after digitalization. One of our patients a female, aged 38 years, who came under observation lately, had all the usual symptoms and signs of thyrotoxicosis. Her pulse rate was 120 per minute, and blood pressure 130/85 mm. of Hg. Her lungs were slightly emphysematous. Examination of the heart did not reveal any abnormality apart from the increased rate, but electrocardiogram revealed definite evidence of toxic myocarditis.

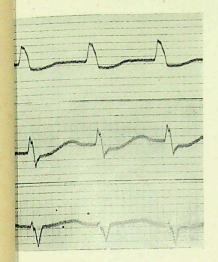
Obstructive jaundice.—In chronic obstructive jaundice the retained bile salts exert a toxic influence on the myocardium causing cloudy granular degeneration and fatty swelling, changes in the muscle fibres. When the patient is examined, evidence of the above changes in the muscles can rarely be detected, but an electrocardiographic examination often shows that the myocardium is damaged.

The following case may serve as an illustration:-

Fig. 5 is an electrocardiogram of an Anglo-Indian female, aged 28 years, suffering from obstructive jaundice for the last year and a half. She had a big liver, which was somewhat firm in consistency and slightly tender. Her stool contained very little bile and her van den Bergh reaction was immediate direct and her van den Bergh reaction was immediate direct positive with a bilirubin content of nine units. Her general condition was fairly good, but her electrocardiogram showed marked toxic myocarditis.

Epidemic dropsy.—In Bengal this "malady must be considered as a serious problem, and many deaths occur every year during the epidemic outbreaks in different parts of the

# PLATE I



Case 1.

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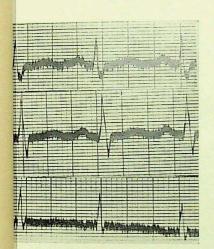
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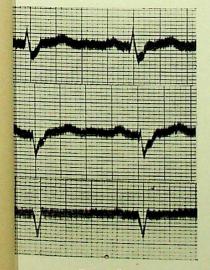
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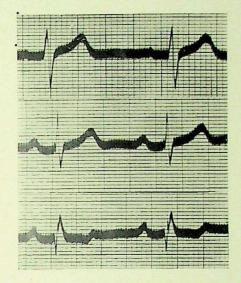
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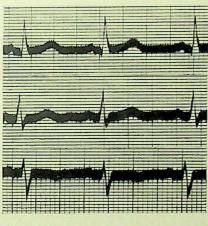
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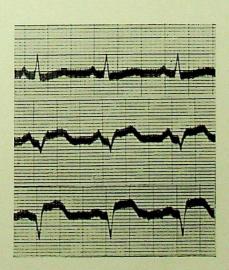
Case 7.°



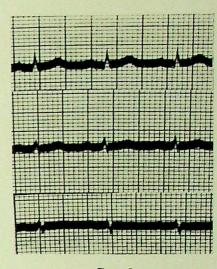
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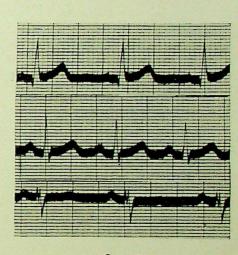
Case 5.



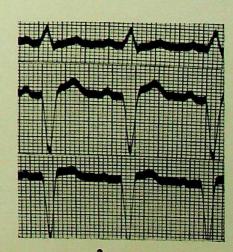
Case 8.



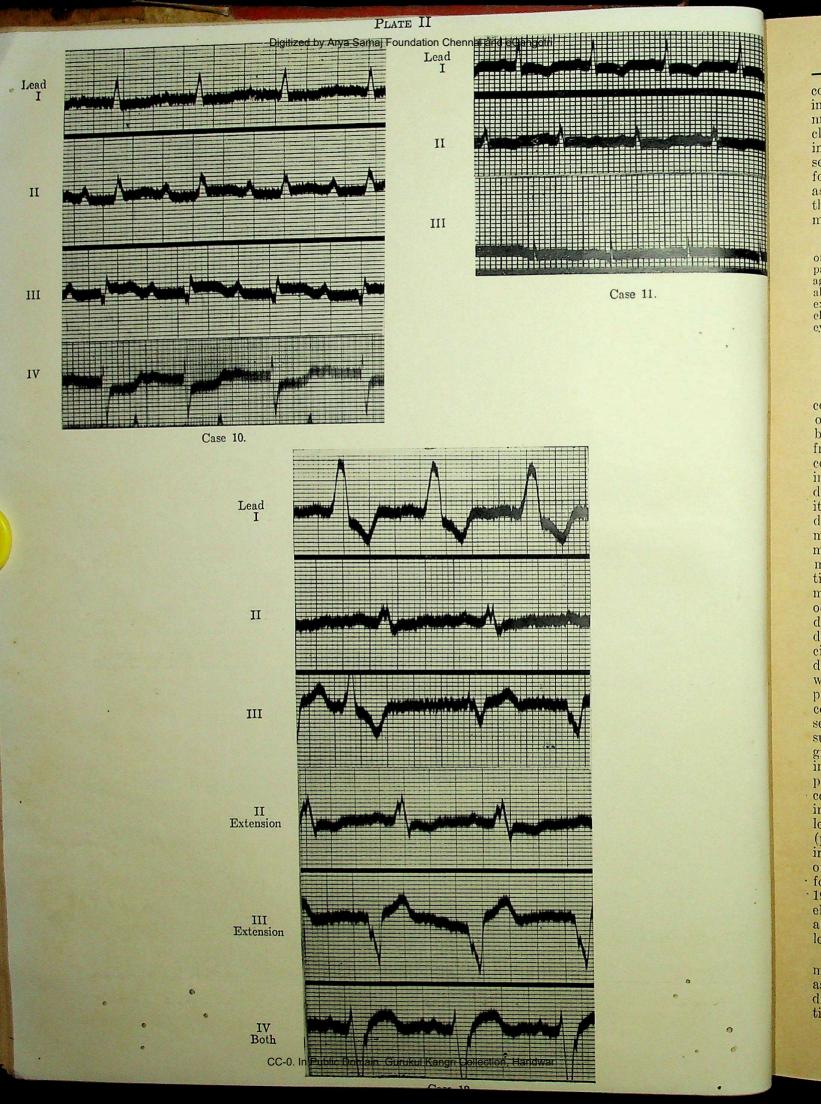
Case 3.



Case 6.



Case 9.



country. One of the common causes of death in this disease is sudden cardiac failure. On many occasions, when the heart is examined clinically, it appears to be normal and yet it is in these cases that death may occur subsequently from acute myocardial failure. To forestall such a catastrophe it is essential to assess the myocardial conditions and one of the surest methods to do this would be to make an electrocardiographic examination.

Fig. 6 shows the picture of the heart of a young man of 23 years, who had been suffering from occasional palpitation since an attack of epidemic dropsy two years ago. The patient looked apparently well and no abnormality could be detected in the heart by physical examination, except that the rate was rapid, but an electrocardiographic examination showed definite cyidence of a toxic myocarditis.

# (b) Degenerative group

The occurrence of degenerative changes in the coronary arteries, gradually leading to a focal or diffuse ischæmic myocardial fibrosis, may be to a certain extent a physiological event from the age of forty-five onwards, but it is encountered more markedly and more frequently in persons who suffer from hypertension, diabetes mellitus, myxœdema, or gout. Heredity is also an important factor. The coronary disease, which is in most cases of an atheromatous nature and which in many cases manifests itself clinically by effort angina, may remain entirely asymptomatic for some time before congestive failure ensues, or the more serious disaster of coronary thrombosis occurs. The electrocardiographic studies made during this silent phase may help us a good deal in estimating the condition of the coronary circulation and the degree of myocardial damage consequent to such ischæmia. Even when the symptoms of effort angina are present, they are not necessarily due to coronary disease, for they may be present in severe anæmia and thyrotoxicosis. Hence in such circumstances, too, the electrocardio-graphic studies become essential. The changes in the electrocardiogram usually consist of prominent Q 3, widened and bizarre QRS complex, deformed ST segment, and iso-electric, inverted or diphasic T waves, particularly in leads I and II. The use of the fourth lead (precordial lead) may be of advantage because in 17 per cent of cases the changes suggestive of myocardial damage and coronary disease are · found in this lead alone (Bourne and Evans, 1938). In one-third of the cases, however, electrocardiographic studies fail to show any abnormality in spite of the use of the precordial lead.

When coronary thrombosis occurs, it usually manifests itself with such symptoms and signs as to enable the physician to arrive at a diagnosis with sufficient accuracy. But sometimes atypical symptoms may mislead one to

the diagnosis of acute abdominal catastrophe, bronchial asthma and even uræmia. Unless investigations are made with the electrocardiograph, the underlying disease will be overlooked and the treatment will be directed on wrong lines. Here are some electrocardiograms which illustrate the above-mentioned peculiarities of the coronary heart disease.

Fig. 7.—Male, aged 65, came in with the complaint of thumping inside the chest and a dull pain in the precordium. On physical examination, no abnormality was detected. Blood pressure was 120/80 mm. of Hg. The electrocardiogram shows—left ventricular preponderance, comparatively small excursions in all the leads, ventricular complexes widened to 0.16 second, notched and slurred. Advanced myocardial degeneration with intra-ventricular block is indicated.

Fig. 8.—Male, aged 53, came in with the complaint of severe pain in the left half of the upper abdomen and the lower part of the left side of the chest. He also vomited several times at the onset of the pain, which was thought by his family physician to be of gastric origin, and treated accordingly with gastric sedatives and gavage, without appreciable relief. On examination, pulse rate was 124 per minute, rhythm regular. Blood pressure 120/85 mm. of Hg. Heart sounds were feeble. There were no other physical signs of importance. On enquiry, the patient gave no history of previous attacks of dyspnæa or angina. The electrocardiogram showed coronary thrombosis.

Fig. 9.—Male, aged 72 years, came in with the complaint of oliguria for one week and anorexia for one month. Heart sounds were feeble. Rate was 100 per minute and rhythm regular. Blood pressure 100/60 mm. of Hg. Superficial arteries were markedly thickened. Urine showed a trace of albumin. The electrocardiogram showed left bundle branch block (new nomenclature) and coronary insufficiency.

Fig. 10.—Male, aged 70 years, came in with the complaint of sudden griping pain all over the abdomen and frequent vomiting followed by some breathlessness. Heart sounds were feeble, rate 100 per minute, regular. Blood pressure 90/60 mm. of Hg. Arteries were thickened. Lungs emphysematous. Blood examination revealed leucocytosis (17,160 per c.mm.) of the polymorphonuclear type (82 per cent). Urine showed trace of albumin and a few hyaline and granular casts. The electrocardiogram showed P-R interval 0.22 second; QRS grossly notched in all the leads; T deformed in all the leads; ST marked 'high take off' in lead III; also depressed in I and deformed in II. Chest lead confirmed presence of coronary thrombosis.

Fig. 11.—Male, aged 43, came in with the complaints of headache, insomnia and haziness of vision for ten days. He gave a history of suffering from diabetes mellitus and high blood pressure for the last two years. On examination, his blood pressure was found to be 240/150 mm. of Hg. Arteries were markedly thickened. No abnormality in the heart could be detected by physical examination. Urine showed the presence of sugar and albumin. The electrocardiogram showed marked myocardial degeneration with coronary sclerosis.

Fig. 12.—Male, aged 63 years, came in with the complaint of giddiness and breathlessness on accustomed exertion for one year. Occasionally, he used to get a mild sub-mammary pain on the left side with no definite radiation. Blood pressure was 175/100 mm. of Hg. Arteries were markedly thickened. Pulse rate 82 per minute and irregular due to extra-systoles. No abnormality was detected in the heart except the extra-systoles and feeble heart sounds. Lungs were emphysematous. The electrocardiogram showed ventricular extra-systoles, widened and grossly notched QRS with T in the opposite direction in I and III, ST depressed in I and II, elevated in IN; evidence of left bundle branch block with coronary sclerosis.

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REPORT OF TWO POST-MORTEMS AND FIVE CASES OF ADDISONIAN PERNI-CIOUS ANÆMIA

By GEOFFREY F. TAYLOR, M.A., M.R.C.P. (Lond.) MAJOR, I.M.S.

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#### and

# NAND LAL CHITKARA, M.B., B.S.

BECAUSE of the interest taken in macrocytic tropical anæmia in India due to the work of Wills (1931 and 1934), Napier (1936 and 1939) and others, and also because of the occurrence of severe anæmias due to such causes as ankylostomiasis and malaria, the occurrence of true Addisonian pernicious anæmia tends to be overlooked in India. Davidson and Fullerton (1939) in the Medical Annual write that 'Pernicious anæmia is apparently comparatively rare in India and the East', while Ungley in the Goulstonian lecture of 1938 said 'Pernicious anæmia is pre-eminently a disease of Europe and North America'.

In the Punjab, true pernicious anæmia is not rare. We give below details of five cases and two post-mortem examinations of cases, recently seen in the medical wards of the Mayo Hospital, Lahore.

Case 1.—Hindu, male, aged 60, agriculturist, admitted on 25th November, 1937.

Complaints .- Six months' weakness and swelling of

the whole body. wasting of abdomen or limbs which were still covered with apple for The relationships which were still covered with ample fat. The colour of the skin was typically lemon-tinted. The muscles were flabby. There was no history of diarrhea or soreness of the tongue. He had lived on an ample Punjabi diet. There was no

history of malaria Examinations.—Heart slightly enlarged; apex beat in the 6th intercostal space; systolic murmur pulmonary area and marked bruit-de-diable.

Spleen and liver not palpable. Teeth, no yorrhœa, tongue normal, no superficial marked glossitis. pyorrhœa,

#### (Continued from previous page)

#### Summary

1. The occasional difficulties in the diagnosis of heart disease unaided by the electrocardiograph have been pointed out.

2. The value of electrocardiography in diagnosing silent phases of serious cardiac disorders has been stressed.

3. Illustrative electrocardiograms have been

appended.

We wish to express our sincere thanks to Lieut.-Colonel J. C. De, I.M.S., Superintendent, Medical College Hospitals, for permission to publish the case records, to Lieut.-Colonel E. H. Vere Hodge, I.M.S., for the records in connection with figures 1, 4, 6 and 7, and to Mr. A. C. Sinha for his technical help.

#### REFERENCE

Bourne, G., and Evans, C. (1938). Lancet, ii, p. 1354.

There was no sign of nervous disease: reflexes and sensation normal.

Blood examination-

Date	Total red cells in 10° -per c.mm.	Hæmo- globin, per cent	Size of red cells,	Reticulo- cyte count, per cent
26-11-37 5-12-37 14-12-37 20-12-37 1-1-38 6-1-38 20-1-38 29-1-38 28-2-38	1.10 1.50 2.50 3.50 3.75 3.80 4.10 4.25 5.00	25 35 55 65 75 80 80 80	8.0 8.1 	2 46 10 8 5 3 3 2 2

The leucocyte count was 3,000 per c.mm. on admission and no nucleated red cells were seen; anisocytosis and poikilocytosis were very marked.

The van den Bergh reaction was indirect positive.

Gastric analysis.—No free hydrochloric acid after porridge meal or histamin injection.

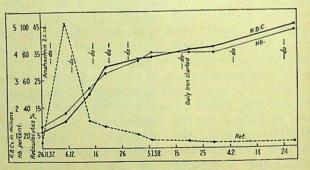
Stool examination.—Negative for ova, cysts and

amæbæ.

Sternal puncture.—Rare megaloblasts and a few normoblasts.

The diagnosis of pernicious anæmia was tentatively made in spite of the absence of nucleated red cells in the peripheral circulation.

He was given anahæmin (B. D. H.) 2 c.cm., intramuscularly, three times in the first fortnight and then at weekly intervals.



Case 1.

There was a typical reticulocyte response after six days, when the reticulocyte count rose to 46 per cent. The accompanying chart shows the changes in the blood picture (case 1). In two months the hæmoglobin had risen to over 80 per cent and red cell count to 4,000,000. He was discharged after three months' treatment with 95 per cent hæmoglobin and

At the end of January he began to develop a colour index below unity when he was put on iron and ammonium citrate, 30 grains, thrice daily. The resulting rise in hæmoglobin and red cell counts as the result of iron treatment is well shown in the chart.

The patient has been readmitted into the Mayo

Hospital on 2nd July, 1939, with the same complaints. His present laboratory reports are—Hæmoglobin 25 per cent (Sahli), total red cells 1,430,000, total leucocytes 3,125, polymorphonuclears 62 per cent, lymphocytes 36 per cent and eosinophils 2 per cent.

The film shows marked polkilocytosis and anisocytosis. No nucleated red cells are seen. Size by Eve's halometer-8.2 to 8.6 micra, colour index 1.08, reticulocytes

The van den Bergh reaction-delayed direct and

indirect reactions positive. Icteric index—4.

Gastric analysis.—No free hydrochloric acid after either porridge meal or histamin.

Sternal puncture

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(b) Red cell series

Normoblasts 14.0 per cent. 3.6 " " Erythroblasts 8.4 " Megaloblasts

Two megaloblasts whose cytoplasm was polychromatophilic were also seen.

Mean corpuscular volume-112.

Ratio of (a) to (b)—2.5 to 1. This case is still in the hospital and under treatment

with Lilly's concentrated liver extract.

The curious feature of the case is the absence of nucleated red cells from the peripheral blood, otherwise he is a typical pernicious anamia case, with the typical response to purified liver (anahamin). The relapse in the blood picture is due to his stopping treatment when leaving hospital.

Case 2.—Hindu, male, aged 22.

Complaints.—Diarrhoea for six months, weakness and

low irregular fever.

Condition on admission.—Wasted, severe anæmia and some dehydration of tissues; stools 20 daily, fluid, no mucus, or blood. No evidence of dysentery or tuberculous infection.

On examination.—Heart not enlarged, but a typical hæmic systolic murmur heard. Spleen and liver not palpable; tongue normal; teeth and gums normal. Central nervous system, nothing abnormal found.

Blood examination—Red cells 1,500,000 per c.mm.; hæmoglobin 40 per cent; colour index 4/3; leucocytes 11,500 per c.mm.; size of red cell, 8.6 micra; anisocytosis, marked poikilocytosis, and megaloblasts present.

Gastric analysis.—No free hydrochloric acid after

porridge meal, or after histamin injection.

Stool examination.—No amœbæ, cysts or ova.

Urine.—No urobilin, albumin in traces. van den Bergh.—Indirect reaction positive.

Treatment.—For three weeks before diagnosis was made, iron and ammonium citrate was given, 30 grains

thrice daily, and condition became worse.

Pernæmon forte (Organon Laboratories) 5 c.cm. intramuscularly for two consecutive days were given. The blood count improved for two weeks and then remained stationary. There was a typical reticulocytic response, 60 per cent after one week. As the effects of Pernæmon appeared to last for two weeks only, a weekly injection of 5 c.cm. was given until the red

cells reached 4,750,000 and hæmoglobin 90 per cent. From this it appears that Pernæmon should be given at weekly or fortnightly intervals and not at intervals

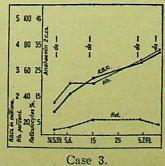
of one month as the makers recommend.

The clinical picture improved as soon as the liver treatment began and the diarrhea stopped, almost immediately. This case appears to be a typical one.

immediately. This case a Case 3.—Mohammedan, male, aged 65, a fruit-seller by profes-

Admitted on 8th June,

Complaint. - Difficulty in swallowing and sensa-tion of food sticking at the upper part of the esophagus and severe muscular weakness for three months; low irregtemperature for 20 days; tingling sensa-tions and anæsthesia of



Symptoms increased gradually and he often fainted on standing. No history of diarrhea.

Examination.-Lemon colour of the skin; heart normal; the muscles were flabby; spleen not palpable; liver palpable; reflexes normal.

Blood examination .-

-	Date	Total red cells in 10° per c.mm.	Hæmo- globin, per cent	Size of red cells,	Reticulo- cyte count, per cent
	31-5-39	1.40	35	8.1	2
	6-6-39	2.10	50	8.1	3 6
	15-6-39	2.75	50	7.8	6
	4-7-39	3.75	68	7.9	6
	11-7-39	3.75	75	7.7	4

The leucocyte count was 8,000 per c.mm. on 31st

In the film, poikilocytosis and anisocytosis were present, but no nucleated red cells.

Stools.—Negative. (No worms passed after a dose of carbon tetrachloride and oil of chenopodium.)

Gastric analysis.-No free acid after porridge meal,

or histamin injection. van den Bergh.-Indirect weak positive; icteric index 6; sedimentation rate (Westergren) 6 mm. in one hour. Wassermann reaction.-Negative.

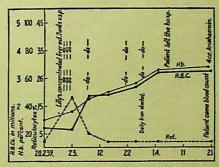
He was given anahæmin intramuscularly and the esponse in red cells and hæmoglobin is shown in the figure.

No rise in the reticulocyte count was found.

He was examined under a screen, but no abnormality of the barium on its way down the esophagus was noted. The complaint of dysphagia and anæsthesia has disappeared though the tingling sensation is still The patient is still in the ward at the time

Case 4.—Sikh, male, aged 40, admitted on 20th

February, 1939.



Case 4.

Complaints.—Breathlessness and exertion; soreness of buccal cavity; diarrhœa (four stools a day), for last 15 months. All the complaints had been progressively increasing.

On admission.—The patient was anæmic and lean-

built; his skin was a greenish-yellow hue.

Examination.—Slight ædema of the feet and ankles: ulceration of the mucous membrane of the cheek; no other physical sign.

Blood examination.

Date	Total red cells in 10° per c.mm.	Hæmo- globin, per cent	Size of red cells,	Reticulo- cyte count, per cent
20-2-39	1.20	30	8.4	2
2-3-39	1.20	35	8.4	18
8-3-39	2.40	45	7.8	5
15-3-39	2.40	50	7.9	2
25-3-39	2.70	55	7.6	2 2
2-4-39	3.30	66	7.8	2
21-4-39	3.30	66	7.6	2

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The leucocyte count was 6,250 per c.mm. on 20th

van den Bergh test.-Indirect positive.

Sternal puncture.—Megaloblastic reaction.

Gastric analysis.—No free acid present after porridge meal or histamin injection.

Treatment.—He was put on Lilly's concentrated liver extract, 7 U.S.P. units on 26th February. The treatment and response is well shown in the figure.

The peak of reticulocytosis reached 18 per cent only, ter six days. He was put on iron and ammonium after six days. He was citrate on 26th March.

When the hæmoglobin had reached 60 per cent, he left the hospital and has been coming for anahæmin

when he was discharged from the hospital, the gastric test meal was repeated and no free acid was found. The van den Bergh test was repeated and found to be negative.

\*Case 5.—Hindu, female, aged 25, admitted on 10th April 1030

April, 1939. Complaints.—Progressive weakness in her lower limbs for the last nine months with subsequent inability to walk for the last two months. Started as numbness of the fingers and toes, being transitory in the fingers but spreading in the legs.

Anorexia and discomfort after meals for 15 days.

Previous history.—Diarrhea four years ago for seven months commencing after child-birth—relieved by an injection of campolon. Similar attack about ten months ago, for ten days.

She had been on irregular treatment with campolon, for the last four years. No further pregnancies had occurred.

On examination.—She had a lemon yellow colour and was quite plump. Weakness of the lower limbs with slight spasticity; tendon reflexes exaggerated; Babinski's sign was positive and the abdominal reflexes leads and the abdominal reflexes

Numbness and icy coldness were complained of.
Sensations were intact; sense of position in the toes
and sense of vibration in the tibia were much impaired.
No tenderness of the calf muscles. No trophic

changes present.

Tongue, raw and red.

Blood examination.—Hæmoglobin 75 per cent; red cells 3,170,000 per c.mm.; colour index 1.2, size 7.6 micra; leucocytes 8,126; polymorphonuclears 64 per cent; lymphocytes 26 per cent; monocytes 2 per cent and eosinophils 8 per cent

Anisocytosis and poikilocytosis present. A few nucleated red cells on 15th April, 1939. Hæmoglobin 75 per cent; red cells 3,300,000 per c.mm.; size 7.6 $\mu$ ; leucocytes 7,500 per c.mm.

van den Bergh.—Indirect faintly positive.

Splcen.—Palpable.

Gastric analysis.—No free hydrochloric acid after porridge meal or histamin injection.

Stools.—A few hookworm ova present. Urine.—Albumin and urobilin in traces. Sternal puncture.—Megaloblastic reaction.

The patient was given Lilly's concentrated liver extract and the reticulocyte response, 15 per cent, was obtained after six days.

The blood picture improved, but there was no

improvement in nervous signs.

At the time of discharge blood picture was hæmo-globin 85 per cent; red cells 4,150,000 per c.mm.; colour index, 85/83; size of red cells 7.41 micra.

This is a typical case with sub-acute combined degeneration of the cord. Three other cases of subacute combined degeneration have been in the hospital during the last year but did not show typical pernicious anæmia blood picture.

## POST-MORTEM REPORT NO. 1

Hindu, female, admitted on 14th March, 1939. At the time of admission, the patient was comatose. The history available was that she was given some medicine

by a quack which caused diarrhea for the last three days.

No diagnosis could be reached.

Blood picture was hæmoglobin 20 per cent; red cells 680,000 per c.mm.; colour index 1.4; size 8.6 micra; leucocytes 8,000 per c.mm.; polymorphonuclears 38 per cent; lymphocytes 62 per cent.

Many normoblasts, rare megaloblasts, anisocytosis

and poikilocytosis.

Before blood transfusion could be arranged, the patient died two hours after admission.

Post-mortem report.—A middle-aged anæmic subject

with slight cedema of the feet. Respiratory system.—No abnormality except hypo-

static congestion of the lungs.

Circulatory system.—The heart showed excessive deposit of fat in the epicardium especially lining the papillary muscles.

Left ventricle showed patchy red and pale 'tabby

appearance, valves healthy.

Abdomen.—The stomach showed atrophic areas and contained 12 ounces of dark-coloured fluid with no special smell. No other abnormality.

Spleen .- Normal in size, hard and fibrous-slate grey

Liver.—Pale yellow in colour; gave Prussian-blue reaction. Kidneys and suprarenals.—Both kidneys pale

deposits of fat in the pelvis. colour. Excessive Prussian blue reaction—negative.

No abnormality in bladder and pancreas.

Bone marrow.—It was a deep red colour throughout. Prussian-blue reaction not well marked.

Nervous system.—Not examined.

Sections.-

Liver showed fatty degeneration with golden-brown pigment in liver cells.

Spleen showed dilatation of venous sinuses and hyperplasia of the malpighian corpuscles.

Kidneys showed hyperactivity of glomeruli, here

and there, otherwise no abnormality.

Stomach.—Only muscular coat present; no mucous

Bone marrow.—A few megaloblasts and normoblasts present.

Diagnosis.—Pernicious anæmia.

## POST-MORTEM REPORT NO. 2

Sikh, male, aged 40; admitted on 10th February,

Complaints.—Severe anamia and abdominal pain of 2½ months' duration. The patient died before complete clinical and laboratory examinations were done.

Post-mortem report.—Body well developed,

marked pallor.

Respiratory system.—Pleural adhesions on both sides; the lungs were healthy and showed no evidence of

Heart.—Hypertrophied, left more than right.
Right auricle was full of blood and the whole right,
de dilated. Endocardium showed 'tabby cat' dilated. Endocardium showed

Abdomen.—Localized peritonitis over the dome of right side of liver; stomach showed minute hæmor-rhages, and no other pathological appearances.

Spleen.—Marked splenitis.

Liver.—Lemon yellow colour and showed Prussianblue reaction

Kidneys.—Marked pallor and fine cysts on the surface of both the kidneys.

Bladder and pancreas.—Normal.

Bone marrow.—Deep red and gelatinous.

Nervous system.—Nil.

Heart.—Fatty degeneration.

Spleen.—Trabeculæ increased and passive congestion. Kidneys.—Passive congestion.

Bone marrow.—Megaloblastic reaction.

Liver,-Deposits of hæmosiderin and patchy necrosis.

(Continued at foot of next page)

# M 3, A NEW DRUG IN THE TREATMENT OF MALARIA

By R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)

> BREVET-COLONEL, I.M.S. (Retd.) D. N. ROY, M.D., D.T.M.

R. T. M. HAYTER, M.B.E., I.M.D.

and

B. SEN, B.Sc., M.B.

(from the School of Tropical Medicine, Calcutta)

THE Italian Biochemical Institute of Milan which have introduced the antimalarial drug to which the trade name of 'M 3' has been given, claims that this preparation not only confers absolute protection against malaria on an individual which may last for about 6 months in the tropics, but that it is also capable of preventing relapses. It is also claimed as a curative in chronic malaria, and it is said that the cure is brought about by the destruction of the gametocytes. A marked diminution in the size of the spleen and improvement of the general condition of the patients are said to follow its administration in such cases. The manufacturers recommend treatment of acute cases with quinine, after which they advise that M 3 should be prescribed.

The fact that this preparation does not possess any prophylactic properties has already been pointed out by Chopra and Basu (1939). In the experimental work which these authors carried out, volunteers who had been given the prescribed course of M 3 were allowed to be bitten by Anopheles stephensi, artificially infected in the laboratory. The infection developed

in due course.

Our conception of the part played by gametocytes in causing relapse is quite clear and therefore if the drug has any action in preventing relapse it can only do so by destruction of the asexual forms of the parasites.

# (Continued from previous page)

#### Acknowledgments

We wish to thank Lieut.-Colonel Amir Chand, I.M.S., Professor of Medicine, King Edward Medical College, Lahore, for allowing us to publish his cases, Dr. Pran Nath Chhuttani, M.B., B.S., for doing the blood counts of the recent case and Dr. Vishwa Nath, Assistant to the Professor of Pathology, K. E. Medical College, Lahore, for the post-mortem reports.

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The manufacturers, at the time they sent this drug to us, assured us that it had stood and would stand any clinical tests. This induced us to assess its value in the treatment of malaria, and investigations were carried out on the following lines in the Carmichael Hospital for Tropical Diseases :-

- The action of M 3 on the sexual and asexual stages of plasmodial parasites of man was determined.
- (2) Its power of preventing relapse was observed.
- (3) Its utility in the treatment of chronic malaria was estimated.

The type of cases experimented upon and the results obtained are recorded below:

Case 1.—A student, who was admitted into the Carmichael Hospital for Tropical Diseases, and showed malignant tertian rings and crescents in his blood, was put on a course of M 3, one tablet daily. His fever was not checked in the course of four days. On the other hand, it increased to such an extent that he had to be treated immediately with quinine and plasmochin Just before quinine was administered, laboratory-bred A. stephensi were fed on him. The occurrence of infection in the salivary glands in due course clearly indicated that the crescents had not been acted upon by this drug. The patient was thereafter put on a by this drug. The patient was thereafter put on a full course of M 3 and, as he was discharged before the course was completed, the matron of the hostel where he was staying was specially instructed to see that the rest of the course was given to him in the morning in her presence. After an interval of a month, he was given another course of M 3, and we are satisfied that the patient took this medicine regularly, according to our instructions.

Soon after the termination of the second course, he had two attacks of fever and each attack was temporarily checked with quinine. As he showed no signs of improvement, and as the spleen was considerably enlarged, he had to be treated with ordinary

antimalarial remedies.

Case 2.—The patient was admitted with malaria and malignant tertian rings in fair numbers were detected in blood smears. He was put on M 3, one tablet a day, which was discontinued on the fourth day on account of a high rise of temperature which necessitated treatment with quinine. He was again put on a course of M 3 and the directions given by the makers were strictly followed. Towards the later stage of its administration, he had a relapse which was treated with quinine; M 3, however, was not discontinued. Soon after the fever was stopped gametocytes made their appearance in the peripheral blood and continued to be present in spite of the fact that M 3 was being administered. They were later destroyed by treatment with plasmochin with plasmochin.

Cases 3, 4 and 5.—Three volunteers, who had been given a regular course of M 3 as prescribed by the manufacturers, were successfully infected with malignant manufacturers, were successfully intected with malignant tertian malaria by the bites of A. stephensi one month after this drug was stopped. The fever induced by the mosquito bites was treated with M 3, and when it was found that the drug made no impression in regard to fever and parasites in the peripheral blood it became necessary to treat them with quinine. One of these patients had four relapses and the other six in course of three months. During the period they were under M 3, crescents appeared in the blood of were under M 3, crescents appeared in the blood of two of them. A. stephensi fed on one of them, even after a fortnight of M 3 treatment, became infected. Case 6.—This patient had suffered from chronic malaria for a long time. Blood examination at the

time of his admission showed rings and gametocytes of Plasmodium malariæ, though there was no fever and the spleen was considerably enlarged. He was put on a course of M 3, but treatment for ten days had no

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effect on the parasites, either sexual or asexual. Administration of quinine became necessary on account of the high rise of temperature and M 3 was

Case 7.—This patient, like case 6, had suffered from chronic malaria for a long time before he was admitted into the Carmichael Hospital for Tropical Diseases. At the time of his admission he had no fever though At the time of his admission he had no lever though scanty malignant tertian rings and a few gametocytes were detected in blood smears. The spleen was enlarged. He was put on a course of M 3 and parasites soon disappeared from the blood. About three weeks after the commencement of the course of M 3, rings appeared in the blood associated with a high rise of tempore time.

Case 8 .- Another patient who gave a history of Case 8.—Another patient who gave a history of having suffered from chronic malaria showed a large number of rings and scanty gametocytes of *P. vivax*. As his general condition was unsatisfactory, he was treated first with atebrin after which a full course of M 3, as laid down by the manufacturers, was prescribed. The patient remained in fairly good health for about three weeks after the termination of M 3 treatment when there was a release

when there was a relapse.

The cases referred to above clearly prove the inefficacy of the drug M 3 in treatment of malaria. Its power of destroying gametocytes, as has been claimed, has not been substantiated by the trials we have carried out. Even when acute cases were first treated with quinine, atebrin or plasmochin and thereafter put on M 3 treatment, they were not free from relapse. One of our patients (case 1) who had had two courses of M 3 at an interval of a month had two relapses. Neither improvement in the general condition of the patient nor any reduction in the size of the spleen was observed in chronic cases after a full course of M 3 was administered.

When we come to consider its value in protecting an individual against an attack after he has had a course of M 3, we refer to the experimental observations on the same subject made by Chopra and Basu about which reference has already been made in this paper. Such patients are no better protected than those who have taken no drug at all.

The series of cases on which the drug has been tested is undoubtedly small, but in view of the definite results obtained we did not feel justified

in carrying out further trials.

# Summary and conclusion

M 3, a drug introduced by the Biochemical Institute of Milan, is said to consist of iron, manganese and extract of spleen. It was tried in a small series of cases, and proved ineffective both in the treatment of attacks of malarial fever, and in preventing relapses even after the patients had been treated with quinine, atebrin or plasmochin. It did not improve the general condition of the patients, nor did it cause any reduction in the size of the spleen when it was given in the manner prescribed by the manufacturers.

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INOCULATION INTRACUTANEOUS OF GUINEA-PIGS FOR THE DIAGNOSIS OF TUBERCULOSIS

> By C. L. PASRICHA MAJOR, I.M.S.

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Topley and Wilson (1936) in dealing with the diagnosis of tuberculous infection write:

The most delicate test for tubercle bacilli is animal injection, and the most suitable animal is the guinea-pig. The susceptibility of the guinea-pig is extremely high; even minute amounts of infective material will render this tuberculous. The material—sputum, pus, milk, etc.—should be injected subcutaneously or intramuscularly into the thigh; the advantage of intramuscular injection is that the local abscess which forms does not ulcerate through the skin. It is wise to inject at least two animals, in case one dies of secondary infection—an occurrence which is very common after the inoculation of urine or fæces. One animal should be killed 3 to 4 weeks later and, if no signs of tuberculosis are apparent, the other should be kept for 6 to 8 weeks after inoculation before being killed'.

The great drawback to the extended use of animal inoculation tests (particularly valuable for the demonstration of small numbers of tubercle bacilli in a pathological specimen) is the long delay before a definite diagnosis can be made. After a subcutaneous, intramuscular and intraperitoneal injection of suspected tuberculous material an interval of two months may be necessary before a diagnosis can be made. Although a tuberculin test may be used for the diagnosis of tuberculosis in a guinea-pig during life, the result must be confirmed by post-mortem examination.

Intracutaneous inoculation.—This method of inoculation of the suspected material has definite advantages over the subcutaneous and other methods. There is an appreciable shortening of the time in which a positive diagnosis can be made and the subsequent manipulation consists of the demonstration of acid-fast bacilli in smears taken from the ulcer which develops at the site of the intracutaneous injection.

After an intracutaneous injection of the tuberculous material a small nodule develops at the site of the inoculation in 3 to 4 days. The nodule breaks down to form a punchedout ulcer in 7 to 14 days. Tubercle bacilli can be found in smears made by scraping the base of the ulcer. With the development of the ulcer there is an enlargement of the regional ology,

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lymphatic glands. The ulcer may subside and heal completely leaving a small indurated nodule. The intracutaneous method was used by Herrold and Woolsey (1938) who reported better results with this method than by the subcutaneous method.

The intracutaneous method of inoculation was used in the examination of sputum from 11 patients suspected to be suffering from tuberculosis. Cultures were made from each specimen of sputum. The methods and the media used were those advocated by Corper (1938). The cultural examination yielded poor results, only two specimens gave positive cultures, and with the rest the culture tubes were grossly contaminated. The intracutaneous inoculations of a guinea-pig gave consistently good results. An outline of the method and a brief description of the lesions produced are recorded.

A guinea-pig was injected intradermally with 0.2 to 0.4 c.cm. of the sputum under examination. Careful search of smear preparations from these samples showed no acidfast bacilli. One series of animals received the sputum (well shaken up in saline) without any preliminary treatment to destroy the contaminating organisms. Other animals received injections of centrifugalized deposit from a large amount of sputum treated by different methods (3 per cent hydrochloric acid, 5 per cent sulphuric acid, 3 per cent sodium hydrochloric acid, 3 per cent sodium hydrochloric acid, 5 per cent sodium hydrochloric acid, 6 per cent sodium hydrochloric acid, 6 per cent sodium hydrochloric acid, 8 per cent sodium h oxide or 5 per cent oxalic acid solution). The results obtained with untreated specimens were better than with specimens that had been treated to destroy the contaminating organisms. The ulcers were obtained two days earlier with the untreated than with the treated specimens. Occasionally, a local inflammatory nodule developed after 24 to 48 hours but this subsided in 2 to 3 days. In the positive cases the characteristic punched-out ulcer with an angry red base and an irregular bluish margin developed in 7 to 14 days, after the injection of the material. Acid-fast bacilli were demonstrable in scrapings from the depth of the ulcers. In some cases examination of several smears made from the depth of the ulcer were necessary. Every animal that developed typical ulcer, when autopsied 3 to 4 months later, showed extensive tuberculous visceral lesions, most marked in the spleen, liver and

Suspected tuberculous sputum was injected intradermally into a guinea-pig which had been inoculated 4 to 8 days previously with a live culture of human type of tubercle bacilli. A red indurated area about 1 inch in diameter developed at the site of inoculation within 24 hours. Similar injections of sputum from nontuberculous persons produced small nodules at the site of inoculation but without any skin reactions. Animals that have been used for the intradermal test with tuberculous material can be utilized later for this type of allergic

Another advantage of the intracutaneous method of injection is that more than one specimen can be injected in one animal. It is advantageous to arrange the injections in such a way that the arrange arrangements. such a way that the areas are drained by different groups of lymphatic glands. Four specimens can be conveniently given in one animal and the injections so spaced that the regional lymphatic glands lie near the four limbs. The strains of tubercle bacilli can be recovered and obtained in pure culture from the lymphatic glands. The following case illustrates the value of the intradermal method of injection in arriving at a correct diagnosis.

A male, 50 years old, who had suffered from long-continued fever, cough and general weakness was diagnosed as suffering from broncho-moniliasis because of the presence in large number of yeast-like bodies in smears of the sputum. Repeated examinations of the sputum had been negative for tubercle bacilli. Intra-dermal injection of 0.3 c.cm. of the sputum of this patient into a guinea-pig produced a typical ulcer in 14 days. Smears taken from the base of the ulcer showed a number of acid-fast bacilli. Subsequent postmortem examination of this animal showed extensive lesions of generalized tuberculosis with caseous lymphatic glands, and necrotic areas in the liver and

## Summary

The value of the intradermal mode of inoculation in the demonstration of scanty tubercle bacilli in tuberculous material is stressed.

The intradermal method has definite advantages over the other methods of animal inoculation. There is an appreciable shortening of the period required to obtain a positive result. The subsequent manipulations are minimal. This test does not require any complicated procedure or any expensive equipment. It can be carried out readily in any laboratory where guinea-pigs are available. The lesion can be seen without the necessity of sacrificing the animal and tubercle bacilli can be demonstrated in smears from the lesions produced. Four specimens can be conveniently injected intradermally into one animal. An additional advantage of the animal test is that, when positive, it demonstrates that the acid-fast bacilli present in the specimen are virulent to the guinea-pig.

Although cultural methods have economic advantages over the animal tests, it is not possible for every laboratory to undertake cultural examinations. Experience is necessary not only in obtaining satisfactory cultures but in concluding whether the resulting growth is of tubercle bacilli or of non-pathogenic acid-fast

Animals that have been used for intradermal tests can be subsequently utilized for allergic

There is no advantage in the preliminary treatment of such specimens as sputum with

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# ACTION OF ATEBRIN ON MENTAL PATIENTS—A CLINICAL STUDY

By M. V. GOVINDASWAMY, M.A., B.Sc., M.B., B.S. (Mysore), D.P.M. (Eng.) Superintendent, Mental Hospital, Bangalore

During the severe malaria epidemic in Ceylon during 1935-1936, psychotic symptoms were observed in a few malarial patients concurrent with the administration of atebrin. Drs. Fernando and Wijerama (1935) reported a case. A similar case treated successfully at the Mysore Government Mental Hospital, Bangalore, was reported by me (Govinda-swamy, 1936). As atebrin is an extensively used synthetic antimalarial, it is important to know whether (i) it is atebrin that is directly responsible for the mental and neurological symptoms reported in these cases, or (ii) whether atebrin merely precipitates a preexisting disposition to mental disorder. third possibility would be that in these cases it is the malaria, whose cerebral symptoms are well known, that is responsible for observations of this kind, whilst atebrin on account of some defective metabolism is rendered inert.

Similar work not having been done elsewhere, it was thought that there might be a partial solution to some of these questions, if patients who showed definite derangement in their psychological personality were put under the action of atebrin, and observations made whether this drug produced any specific

reactions in such cases.

As a first step in such work, twelve schizophrenics, six manic-depressives, and six delirioid patients were put under the action of atebrin, and the effects studied. The atebrin, which was supplied free by Bayer Remedies Limited, was administered as hypodermic injections, which were given daily in doses of 0.1 gramme, the injections being stopped only when the patients showed some unequivocal symptoms.

These experiments were started in May 1936. Since their continuation depended on suitable cases being available, they were concluded for purposes of the present paper only in May 1938. The observations reported refer to groups corresponding to well known

reaction types—schizophrenic, manic-depressive, and delirioid. In only three cases was it found necessary to report in some detail observations on individual patients. The group observations suffer from one limitation, common in psychiatry, namely, that the diagnostic labels are merely descriptive terms. But every precaution was taken to ensure that the patients in the same group had a large common measure of signs and symptoms. All patients were in-patients of the Mysore Government Mental Hospital, Bangalore, except one who was seen in consultation outside.

Schizophrenic group.—As it was not known how large quantities of atebrin might affect mental patients, only confirmed schizophrenics, with signs and symptoms of about two years' duration, were selected in preference to more useful members of the community. Twelve male patients between the ages of eighteen and thirty and who were in good physical health were chosen. Their education averaged from primary to high school standard, and their economic condition was marginal. The reaction type was catatonic. Disconnections, meaningless excitement, negativism, and stupor were exhibited some time or other, in various degrees, by these patients. All of them had suffered -from malaria previously, but none immediately prior to or during the experimental work.

Every one of these patients withstood large quantities of atebrin before showing toxic symptoms. The minimum amount administered before such symptoms were observed was fifteen daily injections of 0.1 g., and the maximum twenty-five. In one patient, forty-two injections were necessary before any toxic

symptoms were noticed.

Physical symptoms.—(1) The earliest toxic symptom noted was a chalk-like pallor of the face, gradually changing to yellow. The skin of the whole body next took on this colour, and the eyes were affected last. In only half of the patients did the eyes turn yellow, in the other half the colour was a dirty blue. While the yellow colour could be accounted for as being due to the deposit of atebrin, the blue colour cannot be explained so easily. In only one patient, jaundice supervened in addition, as shown by rigors, pain in the hepatic area, clay-coloured stools, intense itching and increased coagulation time of blood to nearly four minutes.

(2) Gastro-intestinal symptoms, such as anorexia, vomiting, and in two patients diarrhea, were observed after the fifth injection. The chief neurological symptoms observed were nystagmoid jerks, giddiness, partly due to the nystagmus, coarse tremors of the hands, ataxia, which was worse when the eyes were closed, and multiple neuritis. This neuritis, associated with decreased tone of the muscles, involved both the extensors and the flexors of the forearm, hand, calf, and foot

#### (Continued from previous page)

any reagent to inhibit or destroy the contaminating organisms. Satisfactory results are obtained when fresh specimens of sputum collected in ordinary clean scalded jars are used for the intradermal test.

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muscles with corresponding defects in grasping, standing, and walking. Actual wasting of the peroneal muscles was noticed in two cases. All patients recovered from their neuritis with rest, cessation of the drug, feeding with vegetable salads, fruit juices and injections of concentrated vitamins B and C, parenteral liver extract, and intravenous administration of sodium thiosulphate (30 grains for three days).

(3) The temperature rose in eight patients, to a maximum of 102 degrees to 103 degrees and was maintained at that level from a minimum of ten hours to a maximum of six days. Whether this rise in temperature is a toxic symptom of atebrin, or due to an unrecognized infection, it is difficult to say. The temperature came down in all cases with rest, cessation of the drug, and with the administration of omnadin and cylotropine.

(4) Leukopenia was noted after the tenth injection, the fall in the polymorphonuclears being more than in the lymphocytes. No detailed examinations were made and the ordinary examination of blood films did not show any abnormal cells.

(5) A fall in blood pressure was noted in every case, within half an hour after injection, but the fall was not so severe as to cause alarming symptoms.

(6) Routine examination of the urine did not show any abnormality, except that atebrin could be detected in it for weeks afterwards.

(7) All the patients did not show all the symptoms, because the injections were discontinued as soon as a toxic symptom of any severity was noticed.

Mental symptoms.—Mental changes were observed in the case of every patient, which were qualitatively similar, but quantitatively different.

(i) The general tendency was towards reduction of catatonic and negativistic symptoms. The patient became more friendly and co-operative and the stuporous patients had better contact with their environment. This improvement was only temporary, the patients relapsing into their original condition in a few hours to a few days.

(ii) Intellectual disconnections and feelings of unreality, characteristic of these patients, but masked by their morbid introversion, was brought more to the surface during atebrin administration.

It must be remarked, however, that these effects are not specific to atebrin. The majority of schizophrenic patients show good contact with their environment, under the influence of any drug, or disease, which violently alters their somatic status.

The manic-depressive group.—Six patients, between the ages of 22 and 38, of average physical health, were studied in this group. Three of them were depressed, and three were hypo-maniacal. The criteria of diagnosis were

(i) a previous attack, (ii) absence of disconnections, (iii) a pyknic build, and (iv) the

presence of an hereditary factor.

None of the patients in this group could stand such large doses of atebrin as the schizophrenics. Every patient began to show toxic symptoms with the fifth injection and they were immediately discontinued. Fall in blood pressure, alteration in the colour of the skin, slight ataxia, were amongst the earliest symptoms noticed. The subjective experiences of these patients are interesting. (i) All the patients complained of paræsthesia in the tips of their fingers and toes, numbness of the face and funny feelings regarding their body, a feeling that their limbs had changed their shape and size. (ii) Auditory and visual perceptions were intensified in the early stages, the patients saying that they could hear and see more clearly. This intensification was common to both the depressed and elated patients, and hence it is not probably due to the lowered threshold of sensibility commonly observed in maniacal patients. Alteration in time perception was in the direction lengthening.

(iii) During the period of atebrin administration, no perceptible change was noticed in the maniacal patients, but the depressives were

definitely less miserable.

The following case report of a cyclothyme patient seen in consultation is interesting:—

The patient was a sturdy Englishman, about 40 years of age, of a pyknic build, well placed in life, who, suffering from malaria, had two injections of atebrin (0.1 g.), the second injection two days after the first. No untoward symptoms were noticed after the first, but two hours after the second injection, he felt giddy, and faint. He was brought to in a few minutes, with smelling salts, a coramine injection and hot coffee. When seen within an hour after this attack, he complained of disturbances in perception, almost exactly similar to those described above. Being well educated, and intelligent, he gave a clear, reliable account. He said that he felt as if the whole of the right side of the body did not belong to him and that he was floating in space. He had a feeling that a very big, oversized, but very light half of the body was loosely joined to his left half. It appeared to him that all the furniture in the room had become disarranged, and solid old-fashioned heavy chairs and tables looked angular and modernistic. No definite neurological changes could be made out, but it seemed that space localization, and stereognosis were rather defective. His blood pressure was 140-95, his arteries did not show any atheromatous changes, the fundus was normal, and his blood Wassermann reaction negative. The patient recovered completely in a few hours.

A significant point in the history of this patient was that he was a confirmed alcoholic with an euphoric personality, but with no history of any alcoholic neuritis or delirium tremens. The experience of my medical colleagues and myself has been that alcoholics do not stand atebrin well.

Delirioid patients.—Atebrin was administered to six delirioid patients, the object of study being only to note whether the confusion and restlessness was intensified or not. These

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delirious patients were suffering from different diseases, pyrexias of unknown origin, puerperal sepsis, syphilitic excitement and anemias, the only common symptom being confusion and disorientation. Not more than five injections were given, and the tendency in all cases was towards decrease and definitely not an increase in the delirioid state. Delirium and epileptiform attacks have been included in the reports of toxic symptoms of atebrin (Findlay), but they were not observed in our patients.

The following case report of a patient is of

interest in this connection :-

A Mohammedan woman, about 40, lean, weak, and anæmic, was transferred from St. Martha's Hospital, to the Mental Hospital, Bangalore. The history was that she was admitted to the hospital suffering from malaria (benign tertian parasites found in the blood), and was being treated only with quinine. Two days prior to transfer, she became restless, confused, difficult to control, and developed auditory and visual hallucinations. These abnormalities were present in the apyrexial period when she was examined at the Mental Hospital, but were more intense when she had fever.

She was given four daily injections of atebrin (0.1 g.). As she was also slightly jaundiced and weak on admission she was given cylotropine and coramine, as injections, and liver extract and iron by the mouth. After a week, not only was she free from fever, but became more co-operative and rational. Atebrin was stopped and she was given a stimulant, and anti-anæmic line of treatment. She was discharged from the

hospital, recovered, in a month.

An unexpected opportunity was afforded for further study of the case reported by me in the Lancet, a year after his discharge, when he interviewed me as a follow-up case. He was a thick-set man who looked fit and healthy, and for experiment he was given one injection of atebrin (0.1 g.). In a few minutes, he began to talk incoherently, became confused, and discrientated, and he showed coarse nystagmoid jerks. He recovered completely in two hours with rest and a cup of hot milk. It would be of great interest if other doctors, who have reported cases of atebrin psychosis, could administer small doses of atebrin to those patients in their normal phase and see whether they develop any abnormal mental symptoms.

#### Conclusions

Our study has been incomplete in many respects, and the conclusions are mostly negative. The following conclusions however seem to be of some positive significance:—

(i) Atebrin in medical doses is well tolerated,

and the toxic dose is high.

(ii) The physical signs and symptoms of toxicity are gastro-intestinal disturbances, rise in temperature, fall in blood pressure, leuko-

penia, and multiple neuritis.

There have been very few reports of serious damage to the liver, kidneys, or blood cells, although they play a very important part in the absorption and excretion of synthetic antimalarials. It is obvious that in severe

· (Continued at foot of next column)

# A SIMPLE ANÆSTHETIC APPARATUS

By E. M. SEWELL MAJOR, I.M.S. Bellary

In the apparatus about to be described I make no claim to originality in design. It has been my endeavour to find the simplest form of anæsthetic apparatus which could, with slight adaptation, be used with reliability for intra-tracheal, intra-pharyngeal, or intra-nasal induction using ether with air or oxygen. This apparatus has been in constant use for the past 3½ years in certain Indian military and civil hospitals by comparatively inexperienced anæsthetists who quickly learned its use, and in whose hands no mishap occurred, a satisfactory standard of anæsthesia being obtained with few exceptions. The apparatus was made for me by Messrs. Charles A. King Ltd., 34, Devonshire Street, London, W. 1.

The apparatus consists of :-

- (1) A Kilner jam or fruit preserve jar of 2 pounds capacity (see figure, 6).
- (2) A Boyle's sight feed tube incorporated in the Kilner jar cap (7).

The following accessory items are also necessary:—

- (1) Magill spatula (laryngoscope) (2).
- (2) Magill introducing forceps (1).

#### (Continued from previous column)

hepatitis, nephritis, and anæmia, atebrin should be cautiously administered.

(iii) Since nystagmus and ataxia were exhibited by the majority of our patients, these symptoms were most likely due to atebrin. Inflammatory gliomatous reactions and necrosis in the corpus callosum and cerebellum due to parasitic emboli, which have been described in malaria (Duerck), did not occur in our cases.

(iv) The mental symptoms are confusion, disorientation, emotional instability, and severe insomnia. They are due to atebrin, but occur only in a minority of patients who have an

idiosyncrasy to the drug.

(v) Manic-depressives, cyclothymes, alcoholics, arterio-sclerotics, and people of a pyknic build, do not tolerate atebrin in large doses. Since these conditions are usually interrelated, idiosyncrasy to atebrin can well be looked for in this group.

#### Summary

Atebrin in large doses was administered to groups of mental patients suffering from well recognized psychiatric syndromes and the results of such administration are reported.

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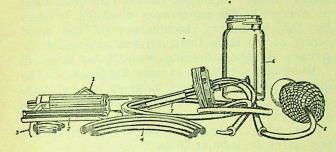
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- (3) Magill india-rubber intra-tracheal curved catheters (4).
- (4) Magill metal connections (assorted sizes) (3).
- (5) Hand bellows (5).
- (6) Spare dry cells and lamps for (1).



After continuous use I can make the following claims for it:—

- (a) Extreme simplicity in construction, maintenance and use.
- (b) Reliability.
- (c) Low initial cost and upkeep, with ease of replacements.
- (d) Portability.
- (a) The system used is extremely simple and a variable concentration of ether is obtainable by means of the Boyle's adjustable tube. The apparatus is easily cleaned. Sub-assistant surgeons have quickly learned to give intranasal and intra-pharyngeal anæsthesia and to maintain intra-tracheal after the introduction of the catheter. For dissection of tonsils the apparatus is connected to the anæsthetic tube of the tongue depressor of the Boyle-Davis or other gag used. By connecting the apparatus to a glass or metal spiral coil in a thermos flask, warmed ether may be given when necessary. Air is blown through or over ether, either by means of hand bellows or a motordriven blower. If desired an oxygen cylinder may be connected to the air inlet of the jar.
- (c) The cost of the jar and Boyle's tube is £1 17s. 6d.

The cost of accessories is approximately £6 10s.

The cap of the Kilner jar has the great advantage that it is standard in diameter for all capacities of jar made. The jar itself is procurable from many European or Indian grocery firms, and, if broken, can thus be replaced with the minimum of delay. I have not included among the accessory items any form of airway. I maintain that no anæsthetized patient should ever be permitted to leave the operation table without the introduction of an airway, yet I have often been struck, not only by the neglect in many Indian hospitals to observe this golden rule, but by the complete absence of any form of airway.

I have found the above form of anæsthetic apparatus so eminently useful in practice that I venture to hope that others, should they de ide to adopt it, may find it equally so.

# VITEX PEDUNCULARIS IN THE TREAT-MENT OF BLACKWATER FEVER

By J. E. MEASHAM, M.D.

Chief Medical Officer, Tea Estates of Messrs. James Finlay and Co., Ltd., and Messrs. The English and Scottish Joint Co-operative Wholesale Society Limited, Anamallai Hills, South India

The writer's attention was drawn to Vitex peduncularis by Messrs. James Finlay & Co., Ltd., Calcutta, in March 1936 by means of an extract from Circular No. 1 (1936) of the Dooars Planters' Association. The extract was entitled 'Vitex Peduncularis and Blackwater Fever' by L. J. de la Nougerede.

In April 1936 Dr. D. Finlayson of Munnar, Travancore, kindly sent me a report from Mr. C. Rowson, a planter of great experience from the same district. Mr. Rowson wrote:—

'I find that Vitex peduncularis does not grow in South India or Ceylon, but many kinds of the same family (Verbenaceæ) do grow in both places.

The Forest Trees of Travancore by T. F. Bourdillon, F.L.S., late Conservator of Forests, Travancore, mentions under Order Verben-

(1) Vitex altissima. (2) Vitex negundo. (3) Vitex pubescens. (4) Vitex leucoxylon.

Under Vitex negundo he writes—"the leaves, root-bark and flowers are employed in local native medicine, the leaves as a tonic and vermifuge, the flowers as an astringent, the root-bark as a tonic". The Indian list of medicinal properties of the plant is however much larger than the Ceylonese and includes headache cures, and cures for rheumatism and bladder complications. I am therefore of the opinion that, if four of this family grow in South India, the other member—peduncularis—will also grow'.

In view of Mr. Rowson's opinion the writer asked Messrs. James Finlay & Co., Ltd., for a supply of seeds and these were received in July 1936. Out of one hundred seeds, four were germinated. One of these plants died, but three remain and have after nearly three years attained a height of over five feet.

References in the literature.—J. C. S. Vaughan (1921) described his experience with Vitex peduncularis. He claimed good results in eight cases of malaria and recovery in three out of four cases of blackwater fever thus treated.

Chopra, Knowles and Gupta (1924) used this drug in a series of cases of malaria and concluded their paper as follows:—

(1) 'Chemical analysis of the dried leaves of Vitex peduncularis shows the presence of traces of an alkaloid.

(2) In our series of cases of malaria fever, however, caused by P. vivax, P. malariæ and L. malariæ, the freshly prepared infusion of dried leaves had no effect whatever on the

parasites in the blood, on the temperature chart, or on the other clinical symptoms.

(3) The drug appears to be absolutely use-

less in the treatment of malaria.'

Their conclusions are directly opposite to those of Colonel Vaughan in so far as malaria is concerned, but they did not try the drug in blackwater fever.

# The present series

This consists of eleven cases which have occurred in the Anamallai Hills from 1936 to 1939. The area is situated in the South-Western Ghats and is approximately seventy square miles in size. The centre of the district is the township of Valparai, 3,700 feet, latitude 10° 20' N. and longitude 76° 57' E. The malaria transmission season is from February until the break of the south-west monsoon in late May or early June. The transmitting agent is A. fluviatilis (Measham and Chowdhury, 1934); no other species out of a total of nearly 10,000 mosquitoes dissected to date by the laboratory technicians of the local centre of the Ross Institute, working under the writer's direction, having been found infected.

Blackwater fever is a rare condition in the district, four cases occurring on the average annually in a practice which cares for some 13,000 persons.

The main features of the eleven cases are now given in tabular form.

Table showing the results of treatment of blackwater fever with infusion of Vitex peduncularis

							THE RESERVE OF THE PERSON NAMED IN COLUMN 1	PRO GREENING	a contract to the contract of the	TO STATE OF THE PARTY OF THE PA
Case					Malarial	Spleen, fingers	Additional	Coursi dura		Result
num- ber	Race	Sex	Age	Туре	parasites	below costal margin	treatment	Days in hospital	Day urine cleared	Result
1	Malayalee	М.	40	Severe. T.103° on admission. Continuous vomiting.	Nil	1		7	3	Cured.
2	Malayalee	F.	13	Severe. T. 105°. Severe vomiting. Profound anæmia.	M. T. rings	8	Atebrin 2 doses.	12	3	Died.
3	Tamil	M.	22	Severe. T. 103°. Vomits everything.	Nil	Nil		15	3	Cured.
4	Malayalee	M.	35	Admitted for clinical malaria. Blackwater on 2nd day. Moderately severe.	Nil	Nil	Quinine for 1 day.	11	2	Do.
5	Malayalce	M.	24	Severe. T. 103°. Vomiting.	Nil	Nil	One dose of atebrin.	29	3	Do.
6	Malayalee	M.	25	Moderately severe. T. 101°. Vomiting.	Nil	2	One dose of atebrin.	10	3	Do.
7	Tamil	F.	38	Very severe. Intense vomiting. T. 103°.	Nil (pigment)	4	Strychnine and digitalin as required.		4	Do.
8	Malayalee	M.	19	Severe. T. 104°. Vomiting.	Nil (pigment)	5		22	3	Do.
9	Malayalee	M.	27	Severe. T. 104°. Vomiting.	B. T. rings	Nil	Quinine for 1 day.	21	4	Do.
10		M	. 25	Admitted for malaria. Black- water on 3rd day.	M. T. rings	Palp.	A course of atebrin.	19	2	Do.
11	Tamil	F	. 33	Severe. T. 104°. Vomiting.	Nil (pigment)	4		21	4	Do.

Note.—Eight cases occurred in the malaria transmission season. There was hæmoglobinuria and albuminuria in every case; in case 9 there was suppression for one day

A study of the above table brings out the following points :-

Race.—The series comprises seven Malayalees, three Tamilians and one European. Malayalees do not comprise more than 5 per cent of the population, and this incidence appears to show a racial susceptibility.

Sex.—There were eight males and three

females in this series.

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Age .- The average age was 26.5 years, the eldest being 40 years and the youngest 1½.

Type.—Except for case 4, all the cases were of a severe type with high fever and intense nausea, vomiting and jaundice. There was suppression of urine in one case for 24 hours.

Urine.—There was hæmoglobinuria in each case and the urine was loaded with albumin.

Blood.—This was examined on admission to hospital in each case. Three cases showed malarial parasites, two of malignant tertian and one of benign tertian malaria. Three cases showed an increase in the large mononuclear cells which contained hæmozoin pigment. Five cases showed no evidence of malaria in the blood.

Spleen.—Four cases showed no increase in size, three slight enlargement, three moderate enlargement and one gross enlargement.

Treatment.—All the cases received an infusion of Vitex peduncularis, one ounce being given hourly until the colour of the urine had returned to normal. Thereafter it was continued in the same dose four times daily for a further three days. It is noteworthy that patients who vomited everything else were able to retain the infusion. Five cases had received one or two doses of atebrin or quinine prior to receiving the infusion, but not in sufficient quantity to influence the course of the disease.

Case 10 received a full course of atebrin in addition. All the cases received tonics and liver in some form during convalescence.

Duration and course of disease.—The average length of stay in hospital was 17 days, approximately, and the urine was clear on the third day after beginning infusion Vitex peduncularis. The general condition improved with the clearing of the urine, though the temperature did not always reach normal until one or two days later.

Result.—Only one out of eleven cases died, giving a death rate of 9.1 per cent. Stephens (1937) gives two mortality tables in which the average rates are 20 per cent and 31 per cent, respectively. Manson-Bahr (1935) gives the average mortality as 25 per cent and Rogers and Megaw (1930) as varying from 10 per cent to 40 per cent.

Conclusion.—The cases recorded were under the actual care of Drs. Dorai Raj, Mannadiar, Gopalan and Kuppuswamy of the Companies' Medical Department. They and the writer are firmly convinced of the beneficial effects of infusion Vitex peduncularis in blackwater

fever, one of its most striking being the rapid disappearance of the severe liver and loin ache which is such a distressing feature of this disease. It has also been noted that the infusion has no effect in albuminuria due to other causes.

## Summary

A series of eleven cases of blackwater fever is given in tabular form and an analysis of the data is made.

It is concluded that the drug is of definite value in blackwater fever and it is hoped that further clinical and pharmacological observations by other workers will be made.

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Note.—Chopra (1936), in his Handbook of Tropical Therapeutics, summarizes the information on this drug, as follows:-

'Vitex peduncularis. This plant grows largely in Bihar, Eastern Bengal and the Central Provinces but it is not very well known. The aboriginal tribes of these localities believe it to have curative properties against malaria, blackwater fever and kala-azar. In Hindi it is known by various names, Nagbail, Nagphani, Charaigora, Chhagriaruba, Minjurgorwa; in Bengal it

is called Baruna and Doda.

The only reference by the old writers regarding its medicinal properties is its use for external application for pains in the chest. Vaughan (1921) found that the aboriginal tribes of certain parts of Bihar were well acquainted with this plant, and used it in the treatment of malarial fever and also of blackwater fever. They prepare an infusion of the leaves, of the rootbark or young stems and take it internally several times a day with much benefit. Preference is given to the dark-coloured root plant over the pale-coloured

Vaughan (1921) tried this drug in a series of cases in both these diseases and reported that it gave very satisfactory results. Chopra, Knowles and others (1924) carefully tested the drug and found it has no effect whatever in malaria.'

One's suspicion is aroused by the claims (not made by the present writer) that this drug is a specific against malaria and blackwater fever. Even if one does not accept the uncompromisingly condemnatory verdict quoted above, it is obvious that Vitex peduncularis is at best a poor anti-malarial drug, and we have good anti-malarial drugs at our disposal.

If it is not on account of its anti-malarial properties, how then does it act? In an attack of blackwater fever there is often one severe hæmoclastic crisis in which all the damage is done: in such a case treatment consists in helping the body to tide over the shock, to recover its normal functions and repair the damage. Whilst it is conceivable that there are many drugs that will assist this, there does not seem room here for a 'specific'.

On the other hand, it is conceivable that there might be some specific drug that would prevent further hæmolysis, and would, therefore, if used prophylactically, prevent the initial attack. Is Vitex peduncularis such a drug? There is no evidence that it has such an action or for that matter that it has any action at all. The clinical trials reported are not very convincing; to be so, they will have to be carried out on a much larger scale. Statistically there is no significant difference between a 10 per cent and a 20 per cent, 30 per cent, 40 per cent or even 50 per cent death rate, when the total number of subjects in each series is only 10, and clinical progress is so much a matter of personal opinion, subject to all kinds of

influences, that it is liable not to carry much weight outside the clinician's personal sphere.

Whether or not a prima facie case has been made out to justify pharmacological investigations, in view of the fact that there are still some thousands of other drugs with local reputations, which are awaiting such investigation, it is for the pharmacologists to decide.

EDITOR, I. M. G.

# A Mirror of Hospital Practice

CONGENITAL ABNORMALITY OF THE EXTERNAL PUDENDAL VEINS WITH ASSOCIATED ERYTHEMA

By C. L. PASRICHA MAJOR, I.M.S.

S. LAL, M.B., B.S.

(From the Department of Bacteriology and Pathology, School of Tropical Medicine, Calcutta)

An Indian male, aged 17, suffering from sarcoids of epidemic dropsy, attended the outpatients department of the Carmichael Hospital for Tropical Diseases. On examination he was found to have certain congenital abnormalities.



These had been noticed by the parents of the boy soon after his birth and were :-

1. A prominent semi-circular venous arch two inches above the pubis. This was prominent and about half an inch thick with the patient standing but was barely noticeable with the patient in an horizontal position. In the latter position the arch could be felt as a groove. The flow of the blood was from the right to the left side of the body. When pressure sufficient to stop the flow of the blood was applied to the middle of the arch the patient complained of heaviness and numbness in the right leg which in a few minutes became unbearable. There was no such sensation in the left leg. In addition to this suprapubic arch there were prominent superficial veins in the upper part of the right thigh and the right popliteal space.

2. An erythematous rash of patchy distribution confined to the right side of the body except in three places (two in front of the abdomen and one on the back) where the rash encroached for about half an inch to the left side of the body. The photograph shows the venous arch, as well as two sarcoids of epidemic dropsy.

The whole picture suggests a congenital defect of the deep venous circulation on the right side of the body.

#### TUBERCULOUS ENDOMETRITIS

By J. R. DOGRA, M.D. MAJOR, I.M.S.

The King Institute of Preventive Medicine, Guindy

A most minutely performed autopsy in which no other tuberculous foci are found is necessary before a claim for primary tuberculosis of the uterine endometrium can be established.

Although an ascending infection is possible, from a practical point of view, tuberculosis of the uterus is almost always secondary to either a generalized infection, when the uterus is one of the organs involved, or is the result of tuberculous infection in the neighbourhood. Direct infection from the tubes is frequent. The case reported here is one of interest inasmuch as it emphasizes a few points which are not always borne in mind.

A Mohammedan female, aged 36, married, was admitted for an irregular 'black discharge' from the vagina—duration one year. Examination revealed a stout but anæmic female with normal temperature, pulse, and respiration. Nothing abnormal was found in the lungs, heart, urinary and nervous systems. Uterus, normal in size and position but the adnexa were not palpable on account of abdominal fat.

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History.-No history of earlier illness. She had two children. The first pregnancy and confinement normal. The second child born in May 1930. Sepsis developed three days after parturition and fever continued for one year. In February 1931, a large tumour in the abdomen was removed; the patient states that it contained pus. A sinus in connection with this wound discharged pus for many months. This presumably was an ovarian cyst or pyosalpinx.

Treatment.—The patient was curetted and swabbed with iodized phenol. The temperature rose to 101, but after slight fluctuations for five days became normal. She was discharged on the 10th day free

from symptoms. It would appear that at no stage did any suspicion of tuberculous infection arise in this case. No clinical signs or symptoms of this infection manifested themselves. A routine examination of the uterine scraping was requested to exclude malignancy. Histological examination showed no evidence of malignancy but revealed small-cell infiltration and endothelial-cell proliferation in a small area along with hypertrophic changes in the endometrial glands. There were no giant cells. Only when several more sections were cut was the true pathology of the condition revealed and the diagnosis of tuberculous endometritis arrived at. Typical appearances are shown in the accompanying photomicrograph.



Endometrium. Showing typical tuberculous appearances.

Tuberculous infection of the endometrium is known to accompany malignant disease of the uterus, but does not occur by itself with any great frequency. Records of the department of pathology of the King Institute, Guindy, during the last ten years show that out of the total examinations of uterine scrapings of 102 cases only one specimen showed tuberculous infection. Of 950 examinations of uterine scrapings done by the department of pathology at the Medical College, Madras, in the last ten years (1928-38) only nine specimens showed tuberculous infection.

In both these series roughly one in every hundred specimens showed tuberculous infection.

The detection of tuberculous infection of the endometrium, however, as in the present case, is of considerable importance to the patient. The source of infection, invariably the adnexa, will require adequate treatment, as simple carettage will not ensure permanent cure. The

pathologist must be on the look out for the tuberculous involvement of the endometrium even when it is not suspected, and he must cut several sections and from different pieces before he can exclude the possibility of tuberculous

The author wishes to thank Dr. Hilda Pallord of the London Mission Hospital for Women and Children, Erode, South India, for the clinical notes of the case, to Dr. P. Ramachandra Rao, Professor of Pathology, Medical College, Madras, for permitting me to examine his records, and the Director, King Institute, Guindy, for permission to publish this note.

#### A CASE OF BRUCELLA ABORTUS INFEC-TION TREATED WITH PRONTOSIL

By V. SIVASANKARAN

CAPTAIN, I.M.S.

Indian Military Hospital, Ferozepore

A seroy, aged 26 years, service eight years, was admitted to hospital on 7th August, 1938, complaining of fever and headache of two days' duration.

Previous history.—Nil.

Recent movements.—Nil. Present in the regiment for more than the last year.

Course of disease.—Duration of pyrexia was 140 days. It was continuous for the first 50 days with a double rise every day. The temperature touched normal on the 51st day but became continuous for the succeeding four days after which it became intermittent. Temperature ranged from a minimum of 98.8°F. to a maximum of 104°F.

Except for fleeting pains in the joints, and occasional sweats, patient was quite comfortable. There was no abdominal discomfort and bowels were regular. Occasionally a non-productive cough worried him. The spleen was enlarged to about 4 finger-breadths below the left costal margin. It was tender and soft. With the general recovery of the patient a gradual reduction in the size of the spleen was noticed. The liver was also enlarged to about a finger-breadth below the right costal margin the right costal margin.

Blood was negative for malaria throughout the pyrexia. It showed a leucopenia ranging from 4,970 to 6,790 per c.mm. with a relative lymphocytosis.

Though the patient did not show any clinical signs of enteric fever, blood was sent for culture and Widal and the reports were negative for the typhoid group of diseases. The double rise of temperature during the first seven weeks of illness suggested kala-azar but tests for it were negative.

Serum for Br. melitensis and Br. abortus gave the following agglutination results:-

	August 1938					September 1938	
	9th	16th	18th	22nd	27th	9th	15th
Br. melitensis Br. abortus	1,000	1,400 2,500	2,000 2,500	2.500 2.500	2.500 2,500	5,000 10,000	5,000 20,000

The case was diagnosed Br. abortus infection. Urine cultures proved negative for B. abortus, and stools were negative for the enteric group of organisms.

Treatment.—Two courses of Multa fever vaccine were tried with no beneficial results.

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Trypaflavine (5 c.cm. of 2 per cent solution) did not produce any improvement either. The tempera-ture persisted with evening rises and morning

Prontosil album was tried finally: 1.5 grammes were given orally for the first two days. Patient stood the dose well. For the successive seven days 3 grammes were given daily (2 tablets, t.d.s., after food) and finally 1.5 gm. for six days. The temperature dropped to normal after the 4th day of treatment and remained at the normal level. Patients made an uneventful recovery and put on weight. The leucocyte count after prontosil treatment was 6,890 per c.mm. remissions.

Remarks.—The source of infection in this particular case is puzzling. The patient was with the unit pursuing his normal routine work till the onset of the disease. No other case was reported from the unit. As a Punjabi Mussulman he had no chance of getting into contact with pigs. The probable source of infection was cow's milk, and the patient was possibly susceptible to Br. abortus.

Other points of interest were that there were no signs of myocardial involvement throughout the course of the disease, and the pulse remained of fair volume and tension. Urine cultures were

sterile for Br. abortus.

My thanks are due to Lieut.-Colonel C. H. N. Baker for permitting me to publish the case and to the Lahore District Laboratory for their reports.

#### OF CONGENITAL CASE DIAPHRAGMATIC HERNIA

By B. S. JOSHI, M.B., B.S. (Rangoon) Civil Assistant Surgeon, Nyaunglebin District, Pegu, Lower Burma

A Burmese female child, aged 8 years, was admitted into the civil hospital, Nyaunglebin (Burma), on 14th July, 1939, for the treatment of pain in the abdomen and constipation of ten days' duration. The child was very frightened and answered no questions. The parents said that it had had a sudden attack of pain in the abdomen and they had massaged and kneaded the whole abdomen. A Burmese saisaya was called in and he administered certain medicines and massaged the abdomen more briskly. After ten days of intensive treatment, the child was brought into the hospital. All

the abdomen more briskly. After ten days of intensive treatment, the child was brought into the hospital. All along the child had not passed any motion but had vomited off and on. The parents were not sure as to the passage of flatus. The child had been similarly attacked at irregular intervals ever since birth.

On examination, the child was found to be in distress. The breathing was laboured and the abdomen was very much distended. It was tender all over but there was no rigidity. It was tympanitic. No mass was felt anywhere. Liver dullness slightly diminished. On auscultating the abdomen peristalsis was heard. Lungs:—Right lung normal, left lung no breath sounds heard at all, but it was resonant. The child had a temperature of 100°F., pulse 136 and respiration 38 per minute. A provisional diagnosis of intestinal obstruction was made. The parents refused operation. She was given turpentine stupes to the abdomen, placed in Fowler's position, and a turpentine enema was given. The result of the enema was poor. She was given pituitrin ½ c.cm. and enema repeated in half an hour. The result was again poor, only a little fæcal matter coming through. Examination of this motion revealed many cva of roundworms. As I had seen a few cases of mild intestinal obstruction caused by roundworms, I gave her santonin grains 2, calomel grains 2 and sodium bicarbonate grains 5, at night. She passed

a motion next day but brought out no worms. Her temperature was 99°F., the distension of the abdomen was much reduced and she was more comfortable. Her evening temperature was 100.5°F. On the 3rd day her temperature in the evening was 102°F. and she had passed a motion. An enema was given with good result. On the 4th morning she passed four motions by herself in quick succession and her temperature was 101°F in the evening. On the 5th morning her temperature 101°F. in the evening. On the 5th morning her temperature was 101.5°F. and her abdomen distended again. She was in distress with a fast and feeble pulse. She vomited a large roundworm and died the same evening. Fortunately I was allowed to do a post

Post-mortem findings.—On opening the abdomen, I found the coils of intestine adhering together and thick greenish flakes of pus here and there. A big loop of the transverse and descending colon was seen to go through an opening on the left side of the diaphragm into the left pleural cavity. This could not be pulled out. On opening the chest the right lung was normal but the left pleural cavity was filled with the colon which was found perforated and a bunch of roundworms were coming out of the tear. The left lung was in a very rudimentary condition and had probably never expanded.

#### Summary

A fatal case of congenital diaphragmatic hernia is described. The clinical diagnosis was intestinal obstruction probably by roundworms. The post mortem revealed a congenital diaphragmatic hernia with the colon in the left pleural cavity full of roundworms causing obstruction of the large gut. The left lung was found in its fœtal condition. The child had had attacks of pain in the abdomen off and on since birth and every time responded to native medicine and massage. The colon was perforated either by the roundworms or the brisk massage and the fæcal matter had trickled through the opening in the diaphragm into the abdominal cavity causing peritonitis and death.

#### Acknowledgments

My thanks are due to Lieut.-Colonel D. P. McDonald, I.M.S., for his helpful suggestions regarding this case and also to Colonel R. H. Candy, I.M.S., Inspector-General of Civil Hospitals, Burma, for his permission to publish these notes.

#### A CASE OF LATE RELAPSE IN TYPHOID FEVER

By V. SIVASANKARAN

CAPTAIN, I.M.S.

Indian Military Hospital, Ferozepore

Relapse in 5 to 15 per cent of typhoid fever cases may develop during the actual defervescence but more commonly after an afebrile period of a week or little longer. I am recording the case of a soldier under my care, treated in the medical wards of this hospital, who had a relapse of typhoid, four weeks after the primary attack.

L/D, aged 30, service 12 years in the Indian Army, was admitted to hospital on 27th September, 1938, for fever with rigors, headache and pains all over the body.

Duration.—Two days during which period he was detained in hospital.

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rmy, oody. was Previous history and recent movements.—He was quite healthy all through with no special previous history. He returned from two months' leave on 16th September and had spent his leave shooting in his village and adjacent jungles.

Inoculation history.—He has had his T. A. B. inoculations done periodically, the last dates of inoculation being 19th September, 1937, 0.5 c.cm., and 27th April, 1937, 1 c.cm., at Mardan.

Course of pyrexia.—Patient had a 'staircase' rise of temperature during the first six days of the disease; this became continuous for the next thirteen days. Later fever became intermittent; the total duration of pyrexia was 22 days. The patient made an uneventful recovery from his primary attack and maintained a normal temperature for 28 days. Spleen was never enlarged.

On 14th November, 1938, patient suddenly developed

high temperature with rigors in the morning, the temperature reaching its maximum of 103°F. at 4 p.m. The fever continuous for Was five days with mornremissions and evening rise and was suggestive of malaria. temperature The touched normal on the 6th day of relapse when later it became intermittent for four days. Except for associated general weak

condition the patient had no complications. Patient was quite comfortable except for the rigors in the evenings when temperature of the day reached its maximum. Blood for malarial parasites was persistently negative. Blood was sent for culture and Widal to the district laboratory and B. typhosum was isolated by culture. Patient has been maintaining a normal temperature for the last fortnight, is quite cheerful and has put on weight. General condition is quite satisfactory.

Clinical and district laboratory report

- (1) Blood was negative repeatedly for malarial parasites all through.
- (2) 28th September—

Total leucocyte count	 6,580	per c.mm.
Differential count—		
Polymorphonuclears	72	per cent.
Lymphocytes	 22	,,
Hyalines	 5	
Eosinophiles	 1	,,
29th September—		
Leucocyte count	6,850	per c.mm.
30th September—		
Leucocyte count	6,780	,,

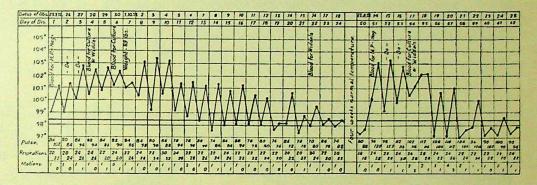
District laboratory reports Primary attack

On 1st October B. typhosum isolated from blood

		T-0	A-O	OXK	OX 19	OX 2
	28-9-38	250	250	175	0	17
Primary	4-10-38 7-10-38	1,250 500	1,250	85	17	17
attack.	17-10-38	700	500 700	50 50	0	0
	29-10-38	700	350	35	0	0
	1-11-38	350	200	50	ŏ l	Ö
Relapse	18-11-38	800 tuph	400	0	0	0

Remarks.—After the primary attack the stools and urine were negative for culture of enteric group of organisms persistently for three weeks. Still the patient had a relapse after four weeks of apyrexia. In this particular case the source of infection might possibly have been the gall-bladder, as there could have been no auto-infection from stools and urine (vide reports).

Another interesting fact was the duration of apyrexia between the primary attack and relapse. Relapse of enteric fever after four weeks of apyrexia is very rare indeed. As to how the inoculation has to do with the onset



of relapse in such a case is still a question to be decided.

My thanks are due to Lieut.-Colonel C. H. N. Baker, for allowing me to publish the report and to the district laboratory, Lahore, for their reports.

#### A CASE OF SCURVY

By (Miss) JIWAN LATA, M.B., B.S.

Medical Superintendent, Lady Butler Hospital, Khandwa, C. P.

THE patient was an Indian Christian nurse aged 37, working in a mission.

She was admitted on 23rd July, 1939, for profuse bleeding from the gums and bruises and petechiæ all over the body for the past four days.

Family history.—Not known, patient being an orphan. Diet.-Mixed, containing meat, fruits, vegetables, etc.

History of present illness.—Patient was quite healthy till four days ago when she applied a powder made from alum and ashes of bones to the gums which started bleeding. The same day she noticed blue patches all over the body, and called in a doctor who treated her by applying tinctura ferri perchloridi to the the gums and private interesting of calcium gluenate. to the gums and giving injections of calcium gluconate and hæmostatic serum for three days. I was then called in consultation. I prescribed Cebion, two tablets three times a day, but the condition became worse and she was brought to the hospital on 23rd July after she had been given subcutaneous saline at home.

Condition on admission.—On admission she was found to have very marked swelling of the gums, the teeth being hidden. Swelling of jaws also very marked. Patient expectorated about half an cunce or more of blood every few minutes. This prevented herefrom

talking and she could not get sleep. There were also petechiæ and bruises all over the body of various sizes varying from a pin point to 4 inches in diameter.

Temperature 100.8, pulse 124 per minute very poor. Condition was diagnosed as a severe case of scurvy.

The following line of treatment was adopted:-

23-7-1939. Cantan tablets by mouth one every hour. Injection of Cantan 1 c.cm. four-hourly. Also given injection of calcium gluconate 10 c.cm. Previous to admission she had hæmostatic serum.

24-7-39. Injection Cantan forte four-hourly. Injection Redoxon forte 5 c.cm. given intravenously. Cantan and later on Cebion tablets used every two hours. Bleeding was less for about three hours after intravenous Redoxon but again started. Injection antevenin 10 c.cm. also given.

25-7-39. Injection Cantan forte or injection Cebion forte, each containing 7½ grs. of ascorbutic acid was given six-hourly alternating with calcium gluconate and later with injection of Manetol. Bleeding slightly less for about six hours but later again increased and patient started bleeding per vaginam also, though her last period was only 15 days ago. Injection antivenin 10 c.cm. repeated.

26-7-39. Injection Cantan forte and Cebion continued six-hourly and two injections of Coagulan (Ciba) given. Tablets continued four times a day.

27-7-39. The same treatment carried on. Improvement definite on the 27th.

28 and 29-7-39. Same treatment, improvement well maintained.

In addition to the above treatment the patient was given calcium lactate 30 grs. and a mixture of iron and arsenic containing 30 grs. of iron and ammonium citrate per dose t.d.s. Her mouth was cleaned with hydrogen peroxide every three hours. She was given also alum gargle. Gums were painted with adrenalin 1–1,000. But local treatment did not help at all. Glycerine-ichthyol was applied externally.

Also she was given glucose per rectum, 5 per cent in normal saline, continuously by the drop method for about six days till the bleeding from her gums stopped. At about the same time the vaginal bleeding also stopped.

Wherever she was given an injection she got a 'bruise' and even when given intravenously, there usually was a small hæmorrhage.

Bleeding was slight from the gums after the 31st July when she was given an injection once a day and two tablets three times a day but on the 5th August, 1939, she again started bleeding rather profusely from the gums and a 'bruise' appeared at the site of an injection. Two injections a day for three days stopped bleeding and later once a day up to the 9th August, 1939. Patient still continues to take tablets and will be kept on one tablet first three times, then twice and later once a day.

The temperature continued till the bleeding nearly stopped and bruises disappeared. It again rose with the recurrence of bleeding.

Diet for the first 5 to 6 days was lime squash drinks frequently, and a little milk and ice to be sucked as much as possible. Later on she was given soups, fruit juices, arrowroot, conjee, etc., any food which she could take easily.

Patient is still in the hospital; she is doing very well and will be discharged after a few days when she has recovered from her anæmia.

The case is of interest because, although for two or three days there appeared to be no hope of her recovery, persistence in carrying on treatment with very large doses of vitamin C brought on some improvement after which she progressed very favourably.

[Note.—Is the diagnosis of scurvy justifiable in this case?

There are many cases in which some clinical improvement will follow the administration of vitamin C other than frank scurvy. In this case the patient received many other medicaments as well. It seems more probable that it is a case of toxic hæmorrhagic purpura.—Editor, I. M. G.l

#### A CASE OF TETANUS TREATED WITH 25 PER CENT MAGNESIUM SULPHATE SOLUTION

By J. N. BHATTACHARJEE, L.M.F., L.T.M.

Gopalpur Tea Estate, Dooars, Jalpaiguri

A tea-garden coolie, a female, aged about 65 years, got an injury on the dorsum of her right hand by a paddy-husking machine (dhenki). The patient was treated and it healed up completely by the 15th day.

From the morning of the 17th day the patient complained of stiffness of her neck muscles. On the next day she was not able to raise her head from the bed. On the morning of the 19th day I saw her and found the following symptoms:—

Feeling of tightness in the jaws and difficulty in mastication and swallowing.

The angles of mouth drawn out producing risus sardonicus.

The patient could not turn herself on her side.

There was no tetanic convulsion of the extremities.

The patient was treated in the following manner:—
She was put in a darkened room, antitetanic serum (1,500 units) was administered once only on the first day of treatment, and she was given a bromide mixture three times a day for ten days.

In addition, 25 per cent magnesium sulphate solution in a dose of 1 c.cm. increased daily by 1 c.cm. up to 5 c.cm. was injected intravenously (total amount 30 c.cm. was administered).

During the course of treatment she showed remarkable improvement and at the end of the second week of treatment she was completely recovered.

Points of interest in the case are:

There were no general tetanic convulsions.

A relatively small amount of antitetanic serum was administered yet the patient recovered.

Treatment with intravenous injection of 25 per cent magnesium sulphate solution was apparently successful.

The disease began after the primary injury was completely healed.

I am indebted to my chief Dr. T. M. Ghosh for his kind permission to publish this note

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### Indian Medical Gazette

#### JANUARY

#### PERNICIOUS ANÆMIA IN INDIANS

In these columns some eighteen months ago we discussed the world distribution of disease and its ever-changing picture. Advancing civilization with its facilities for rapid transport has led to the wider distribution of infectious diseases, and with its opportunities for indulgence to the increase in the incidence of metabolic diseases. However, other accompaniments of civilization, sanitary progress and international quarantine regulations, have done much to counteract these ill-effects, have limited the internal spread, and in many cases completely stopped the extension of epidemics from country to country, whilst medical science has devised means of arresting disease in its earliest stages, and thereby limiting its disabling and its infectious potentialities. As well as the actual changes that are occurring there are the apparent changes, changes in our perception of the picture. Classical examples are cancer, which was, not many years ago, considered to be rare amongst the indigenous inhabitants of tropical countries, and enteric which was never diagnosed except amongst Europeans. Time and the advances of medical science have shown that both these conceptions were entirely wrong. The truth is that, as in their physiological make-up there are few fundamental differences between Indians living in the tropics and Europeans living in temperate climates, there are likely to be few absolute differences in the diseases to which they are susceptible, though there are certain to be relative differences in the incidences of these diseases, just as there are between those in different communities in any country.

Pernicious anæmia is a disease which is reported to be rare in Asiatics; frequent references to this observation will be found in the British and American medical literature. On the other hand 'pernicious anæmia', or sometimes more cautiously 'anæmia of the pernicious type', is a common diagnosis in India. The first trouble is the name, which from all points of view is a most unfortunate one, but the name cannot be changed with every advance that is made in our knowledge about a disease; the expedient of attaching the adjective Addisonian, adopted by some writers, has added to the specificity of the name, but has also introduced another element of confusion. Further confusion results from the facts that many physicians refer to all macrocytic anæmias as 'pernicious'; that the majority

of these anaemias respond, to a greater or lesser extent, to injections of liver extract, the specific for 'Addisonian' pernicious anæmia, seems to add justification to this laxity in terminology. Casual references to cases of pernicious anæmia in Asiatics in the literature should not, therefore, be accepted at their face value. However, from time to time claims have been made for the occurrence of true Addisonian pernicious anæmia in Indians; elsewhere in this number, Major Taylor and Dr. Chitkara state that 'in the Punjab true pernicious anæmia is not rare'.

The question now arises—What constitutes a case of pernicious anæmia? The disease has been recognized as a distinct clinical entity for many years, as a 'primary' anæmia with a high colour index, associated with achlorhydria and subacute continued degeneration of the cord. Recent work has added much to our knowledge of its ætiology and has removed it from the list of incurable diseases, but has done little to define the disease entity more clearly, or to separate it from any associated clinical types—except perhaps from achrestic anæmia, which probably has an entirely different actiology—mainly because, as we have said, our clinical conception of the disease was already a clear one; another reason is the fact that in Europe and America a large majority of the macrocytic anæmias are Addisonian pernicious anæmia, but this statement is not true of the macrocytic anæmias in India and some other tropical and subtropical countries.

Pernicious anæmia is a disease of late middle life, more commonly of males, usually associated with symptoms of severe anæmia, gastrointestinal deficiencies, and involvement of the central nervous system; it is a disease that shows periods of remission and relapse, and, if untreated, ends fatally. Pathologically, it is a macrocytic hyperchromic anæmia, in which megaloblasts appear in the blood from time to time, and in which the bone marrow shows a characteristic megaloblastic activity. The van den Bergh reaction (indirect) is positive, and there is complete achlorhydria, even after histamine injections. Recent work has shown that not only are acid and pepsin absent from the gastric juice, but also the 'intrinsic factor', a substance which with the 'extrinsic factor'. supplied in certain foods, forms a hæmopoietic principle that is essential for the normal maturation of red cells. This hæmopoietic principle is stored in the liver and complete remission of symptoms, except those due to permanent neurological changes, can be effected by administration of the liver extract. This hæmopoietic principle is present in a highly refined form in the so-called West and Dakin fraction of liver extract, which is supplied under a number of proprietary names, e.g., anahæmin, pernæmon forte and examen. The gastric defect is a permanent one and patients must continue to take liver by mouth or receive

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liver-extract injections for the rest of their

lives or the condition will relapse.

How far do the cases reported correspond with this description of the disease? The final criterion is the absence of the intrinsic factor from the gastric secretion. This can only be shown by the extremely complicated method of taking the gastric juice, adding the extrinsic factor, feeding the mixture to a patient with pernicious anemia, and noting whether it causes a reticulocyte response or not. Such a procedure is out of the question in India; we must therefore be content with strong presumptive evidence.

It is generally accepted that the intrinsic factor will not be absent unless there is complete histamine-fast achlorhydria, but the reverse is not the case, for achlorhydria occurs in about 10 per cent of normal individuals.

The neurological changes in pernicious anæmia, though of frequent occurrence, are neither constant nor confined only to this disease, and the megaloblastic reaction in the bone marrow, which is constant in pernicious occurs in other macrocytic anæmia, also anæmias.

Response to anahæmin, with typical reticulocyte rise, is also suggestive, for it has been shown by Napier (Lancet, 1938 ii, 106) and Wills and Evans (Lancet, 1938 ii, 416) that Wills' tropical macrocytic anæmia does not usually respond to anahæmin, though it does to crude liver extracts: however, this again is not conclusive evidence, for Napier (I. M. G., 74, 1) showed that some cases of macrocytic anæmia with normal gastric acidity do respond to anahæmin in large doses; this observation was confirmed by Foy and Kondi (Lancet, 1939 ii, 360) in Macedonia.

Finally, there is the permanence of the gastric lesions and the certainty of the return

of the signs and symptoms unless treatment is maintained. There is a tendency in many types of macrocytic anemia, especially those associated with splenomegaly, for the anæmia to recur when the patients return to their previous mode of life after a year or so (Napier, loc. cit.), but in the case of pernicious anæmia deterioration will commence within one to two months of the discontinuance of treatment.

It therefore resolves itself into a mathematical problem of the frequency of the occurrence of these different findings. A case of recurring macrocytic anæmia in which there are neurological symptoms, complete achlorhydria, and a typical response to anahæmin is not necessarily a case of pernicious anæmia, for the neurological symptoms and the achlorhydria might be accidental associations, but, if such a combination turned up very frequently, one would have to associate it with the pernicious anæmia syndrome.

In Bengal, though we have been studying macrocytic anæmia at the School of Tropical Medicine for some years, we have only encountered cases that fulfilled these criteria amongst Europeans and Anglo-Indians, who form a very small percentage of our hospital cases. The position in the Punjab may be different, but we do not think that the evidence presented in the paper in this number justifies the statement that pernicious anæmia is not rare in that province.

However, we repeat, time has a way of levelling out differences in the distribution of diseases, and we shall be surprised if it is ever shown that the physiological make-up of Indians is such that they are entirely immune from pernicious anæmia, though we still believe that the disease is rare amongst them.

# Special Articles

#### AN ACCOUNT OF INDIAN MEDICINE

BY JOHN FRYER, M.D., F.R.S. (1650–1733 A.D.) By D. V. S. REDDY Vizagapatam

JOHN FRYER, M.D. (Cantab.), F.R.S., may be rightly described as the most observant and learned of all the physicians and surgeons of the East India Company in the 17th century. He came out to India in 1673 and served at various settlements in this country and Persia till 1682. During his journey to his station, Surat, he visited Fort St. George and Masulipatam on the Coromandel coast, and Goa and other places on the west coast. After returning to England in 1682 he published a learned and delightful book on India, 'A new account of East India and Persia,' which is the basis for this article.

#### MEDICAL TOPOGRAPHY

Bombay: Writing of Bombay, Fryer says that the president has his chaplains, physicians, chyrurgeons and domestics. He also refers to the sickly progeny of English women.

'This may be attributed to their living at large not debarring themselves wine and strong drink which immoderately used, influence the blood and spoils the milk in these hot countries, as Aristotle long ago declared. The natives abhor all heady liquours for which reason they approve better pures.' which reason they approve better nurses.'

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Fryer also adds 'The English have only a burying place but neither church or hospital both which are mightily to be desired."

Fryer notes the unhealthiness of Bombay.

'At first thought to be caused by *Bubsho*, rotten fish; but though that be prohibited, yet it continues as Mortal: I rather impute it to the Situation, which causes an Infecundity in the Earth, and a Putridness causes an infection of the Earth, and a Futitions in the Air, what being produced seldom coming to Maturity, whereby what is eaten is undigested; whence follows Fluxes, Dropsy, Scurvy, Barbiers (which is a enervating the whole Body, being neither able to use Hands or Feet), Gout, Stone, Malignant and Putrid Fevers which are Endemial Diseases.'

Goa: Writing of Goa, Fryer refers to the Paulistines who enjoy the biggest of the monasteries at St. Roch.

'In it is a Library, an Hospital, and an Apothecary's Shop well furnished with Medicines, where Gasper Antonio, a Florentine, a Lay-Brother of the Order, the Auther of the Goa Stones, brings them in 50,000 Xerephins, by that invention Annually; he is an Old Man, and almost Blind, being of great Esteem for his long practice in Physick, and therefore applied to by the most Eminent of all Ranks and Orders in this City; it is Built like a Cross, and shews like a Seraglio on the water.'

'We descended from this lovely spectacle to the "Spittle", where we found the Poor faring well from their Benefactors.

their Benefactors.

The forepart of their vespers to the "Natal", I spend at the King's Hospital; where their Care for the Sick is commendable, an handsome Apothecary's Shop furnishing them with Medicines; The Physicians here are great Bleeders, insomuch that they exceed often 'Galen's Advice, an deliquium, in Fevers; hardly leaving enough to feed the Currents for Circulations; of which Cruelty some complain invidiously after Recovery.' their Benefactors.

On his next visit to Goa Fryer lodged at the house of a French physician in the camp of St. Thomas which the city overlooked.

Surat: 'This City (Surat) is very nasty by their want of Privies, and their making Door a Dunghill; yet never had they any Plague, the Heats evaporating, and the Rains washing this Filth away.'

Masulipatam: People were free from sickness during summer but from May, with cooling showers, air grew foggy and Empyemas and fluxes were rifest.

Madraspatam:

'About this mount (St. Thomas) live a cast of people one of whose legs are as big as an elephant's; which gives occasion for divulging it to be a judgment on them as the generation of assasins and murderers of the blessed apostle St. Thomas one of whom I saw at Fort St. George.'

Fryer did not visit Delhi, Agra, or Hugli.

#### Seasons and diseases

'The Diseases reign according to the Seasons; the North blowing, Bodies are rendered firm, solid and active by exhausting the Serous Humours, ad Hyp. 17. Aph. Lib. 3 for which cause Dry Weather is more healthy than Moist, it hastening Digestion, and facilitating Excretion, when no Fevers that are treacherous root themselves in a deep Putrefaction. About the Variable Months they are miserably afflicted with Coughs and Catarrhs, Tumours of the Mouth and with Coughs and Catarrhs, Tumours of the Mouth and Throat, Rheumatisms, and intermitting Fevers; also Small Pox invades the Youth, as in all India, so here; In the extreme Heats, Cholera Morbus, inflammation

of the Eyes by Dust and the fiery Temper of the Air: In the Rains, Fluxes, Apoplexies, and all. Distempers of the Brain, as well as Stomach.'

#### Description of some diseases

Fryer relates that the Governor of Junnar called all his male children and gave the history of their maladies but the details are

Writing of Jehonna and Hohelia, Fryer adds interesting observations on the dangers and diseases of a long voyage of the times.

'A Blessing not to be passed by without a grateful Commemoration, when half the Fleet were disabled by Distempers acquired by Salt Meats, and a long Voyage without Refreshments; and must have suffered too for want of Water, had not they met with a seasonable Recruit.'

'The first care then was to send the Sick Men ashore which it is incredible to relate how strangely they revived in so short a time, by feeding on Oranges and Fresh Limes, and the very smell of the Earth; for those that were carried from the Ships in Cradles and looked upon as desperate, in a day's time could and looked upon as desperate, in a day's time could take up their Beds and walk; only minding to fetch them anights, that the Misty Vapours might not hinder the kind Operation begun on their tainted Mass of Blood, by these specifick Medicines of Nature's own proposition.

Fryer also notes in the course of his visit to a port called Tanore in Malabar district the prevalence of filariasis and records faithfully the traditional lore concerning the ætiology of the disease.

'Of Christians here are not an inconsiderable number. Here are also those Elephant-Legged St. Thomeans, which the unbiassed Enquiries will tell you chances to them two ways: By the Venom of a certain Snake, for which the Jangies or Pilgrims furnish them with a Factitious Stone (which we call a Snake-stone) and is Counterpoyson to all deadly Bites; if it stick, it attracts the Beyron; and mutit it attracts the Beyron; and mutit it attracts the Beyron; and mutit it attracts the street of the Section of the Mills it attracts the Beyron; and mutit is the Mills. and is Counterpoyson to all deadly Bites; if it stick, it attracts the Poyson; and put it into Milk, it recovers it self again, leaving its virelency therein, discovered by its Greenness: As also by drinking bad Water (to which as we to the Air, they attribute all Diseases) when they travel over the Sands, and then lying down when they are hot, till the Earth at Night is in a cold sweat, which penetrating the rarified Cuticle, fixes the Humours by intercepting their free concourse on that side not to be remedied by concourse on that side, not to be remedied by any Panacea of their Esculapian Sectators; it is not much unlike the Elephantiasis Arabum.'

Fryer refers to venereal disease in the Canareese Country:

'The Diseases here are Epidemical, unless Plague Veneris be more Endemial, for which at this Season they have a Noble and Familiar Remedy, the Mango (which they have improved in all it(s) kinds to the utmost Perfection) being a Sovereign Medicine; they are the best and largest in India, most like a Pear-Plum, but three times as big, grow on a tree nearest a plum-Tree; the Fruit when Green scents like Turpentine, and pickled are the best Achars to provoke an Appetite; When Ripe, the Apples of Hisperides are but Fables to them; for Taste, the Nectarine, Peach, and Apricot fall short; they make them break out, and cleanse the Blood, and Salivate to the height of cleanse the Blood, and Salivate to the height of Mercurial Arcanaes; and afterwards fatten as much as Antimony, or Acorns do Hogs; these and Sarsa being their usual Diet.'

#### Critical review of Indian medicine

In the course of his history of India under the particular heading 'Sciences', Fryer hotes

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that, while magic and judicial astrology, grammar and rhetoric, are held in high esteem, 'Elocution, Physick, Metaphysicks, are not out of their element: Their Philosophers maintain an Aristotelian Vacuity; nor are they quite ignorant of Medicks, though Anatomy is not approved wherein they lean too much on Tradition, being able to give a very slender account of the Rational Part thereof.

They are unskill'd in Anatomy, even those of the Moors who follow the Arabians, thinking it unlawful to dissect Human Bodies whereupon Phlebotomy is not understood, they being ignorant how the veins lye; but they will worry themselves Martyrs to death by Leeches, clapping on an hundred at once, which they know not how to pull off, till they have filled themselves, and drop of their own accord.

'Chirurgery is in as bad a plight, Amputation being an horrid thing: Yet I confess it is strange to see, that what Nature will effect on such Bodies, Intemperance has not debauch'd.

'Pharmacy is in no better condition: Apothecaries here being no more than Perfumers or Druggists, at best; for he that has the boldness to practise, makes up his own Medicines, which are generally such Draughts, that if their own Energy work not, yet the very Weight must force an Operation.

'They pretend to understand the Pulse, but the Urine they will not look on. Midwifery is in esteem among the Rich and Lazy only; the Poorer, while they are labouring or planting, go aside as if to do their Needs, deliver themselves, wash the Child, and lay it in a Clout or Hammock, and return to work again.'

Again Fryer says of the Moormen of Surat:

'At their labours they seldom call midwives being pretty quick that way, though there are not a few, live well by that profession; known by tufts of silk on their shoes or slippers all other women wearing them plain. At the end of their quarantine which is 40 days after the old law, women that were Confined, enter the hummums to purify.'

'To Cup they use Venosoes, without Scarifications. They have good Escaroticks and Vesicatories, made by a certain Nut, the same they chop or mark their Calicuts black with instead of Ink.

'They apply Cauteries most unmercifully in a Mordisheen, called so by the Portugals, being a Vomiting with a Loosness; the like is done in a Calenture.

'Physick here is now as in former days, open to all Pretenders: here being no Bars of Authority, or formal Graduation, Examination or Proof of their Proficiency: but every one ventures, and every one suffers; and those that are most skilled have it by Tradition, or former experience descending in their families; not considering either alteration of tempers or seasons, but what succeeded well to one, they apply to all.

'The Tortoise bears the Vogue for altering the Blood; wherefore good in Scurvies got by bad Air and Diet in long Voyages, and for the running of the Reins by impure Copulation; for which 'tis used as an undoubted Cure, purging by the Genitals an Oily viscous Matter of a Yellow hew, if fed upon constantly for thirty days; restoring the decayed Vigour of the Body, and giving it a grace and lustre as elegant, as Viper Wine does Consumptive Persons, or worn-out Prostitutes.'

'In Fevers their method is to prescribe Coolers, till they have extinguished the Vital Heat; and if the Patients are so robust to conquer the Remedies used to quency the Flame of the Acute Disease, yet are they left labouring under Chronical ones, as Dropsy, Jaundice, and El Habits, a long while before they recover their Pristine Heat.'

#### Some home remedies

Here they will submit to spells and charms, and the advice of old women.

Fryer also adds notes on simple home remedies like butter of 400 years' standing 'prized by gentiles as high as gold prevalent in old aches and sore eyes one of which (tank) was opened for my sake and a present made me of its black stinking viscous balsom'

To correct 'distempers of the brain as well as stomach the natives eat Hing, a sort of liquid Assafætida, whereby they smell odiously. For all Lethargick Fits they use Garlick and Ginger, given in Oyl or Butter'. He also refers to the uses and popularity of 'Goa stones' in various diseases.

#### Indian doctors at work

Discussing the inhabitants of India, he divides Brahmins into two chief sects, Butts and Sinais, the latter being fish-eaters.

'The Butts live a life of study abstracted from all worldly employments, unless such as are for saving and preserving of life, the chiefest and skilfullest physicians being of their tribe. The Sinais are more biassed by seculiar offices, farmers, governors of towns, physicians, accountants, clerks and interpreters.

I have seen a Barber undertake the Cure of Bloody 'I have seen a Barber undertake the Cure of Bloody Flux, by pretending the Guts were displaced, and laying the patient on his Back, and gently tickling his Reins, thrust on each side the Abdomen with all his strength; then placing a Pot filled with dried Earth, like that of Samos, upon his Navel, he made it fast by a Ligature; and on some Bodies thus treated he had gained Credit, but this died. Prosper Alpinus mentions something like this among the Egyptians.'

At Surat, Fryer took the help of a Brahmin skilled in simples to identify and learn the uses of various plants. The same person enlightened Fryer on ban and datura 'Here he discovered to me his beloved Alluh the bark of a tree the present remedy against all manner of fluxies' Indarjau? Rohun?

'Here is a Brahmin Doctor who has raised a good

Fortune; they pretend to no Fees, but make them pay in their Physick; and think it Honour enough if you favour them with the Title of your Physician only.

This Brahmin comes everyday, and feels every Man's Pulse in the Factory, and is often made use of for a powder for Agues, which works as infallibly as the Peruvian Bark; it is a preparation of Natural Channaber. Channaber.'

#### FRYER'S ARISTOCRATIC PATIENTS AND HIS STRANGE EXPERIENCES

His medical services were in constant requisition not only in Surat and Bombay but also all over the west coast of India.

Joao Mendes, a wealthy Portuguese of Bassein, sent for him to attend on his only daughter, a handsome girl engaged to marry the Portuguese admiral of the North.

One of the Mogul's generals, who was also Governor of Jeneah (Junnar in Poona District), requisitioned Fryer's services. Gerald Aungier, chief at Bombay, commanded Fryer to render the necessary expert medical aid. On arriving at this place, a letter from President ms, ome

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Aungier, was handed over to Fryer. The communication described who the distinguished patients were but counselled Fryer to be patient till a good and auspicious day presented.

'A good day coming, the Governor sent for me to Visit his Lady in the Haram, which was opposite to a Chamber he sate in, accompanied only with one pretty Wanton Boy, his Only Son by this Woman; upon which account he had the greater kindness for her; An old Gentle-woman with a Tiffany Vail, made many trips, being, I suppose, the Government of the Women's Quarters: at least I was called and admitted with my Linguist.

with my Linguist.

with my Linguist.

'At our being ready to enter, she clapped with her Hands to give Notice; when we were led through a long dark Entry, with Dormitories on both sides, the Doors of which Creeked in our passage (but I was cautious of being too Circumspect) till we came to an aiery Choultry; where was placed a Bed hung with Silk curtains; to which being brought, I was Commanded to place by it, from whence I might conveniently Discourse and Feel her Pulse, putting my Hand under the Curtains. It was agreed among them Hand under the Curtains. It was agreed among them to impose upon me; wherefore at first they gave me a Slave's Hand, whom I declared to be Sound and Free from any disease, nothing contradicting the true Tenor and Rythme of Pulsation; when they began to be more inventions telling me, it was done to true more be more ingenious, telling me, it was done to try me; Then was given me another Hand, which demonstrated a week languid Constitution; and collecting the Signs and Symptoms, I feared not to give Sentence; which met with their approbation, and so I was sent back the same way I came.'

#### A GOLDEN SHOWER OF PAGODAS FOR A VENESECTION

The Caun had been acquainted with what had passed, and seemed pleased; whereupon I must visit the Haram again the next day to Bleed another of his Wives, he being tolerated Four, though he keeps more than three hundred concubines.

And now the Curtains was extended athward the Choultry, and an Arm held forth at an hole; but this was a slight fence for such Animals, who leaning too hard as they peeped, pulled it down, and discovered the whole Bevy, fluttering like so many Birds when a the whole Bevy, fluttering like so many Birds when a Net is cast over them; yet none of them sought to escape, but feigning a shamefacedness, continued looking through the wide Lattice of their Fingers: The Lady I had by the Arm was a Plump Russet Dame summoning the remainder of her Blood to enliven her cheeks (for among the darkest Blacks, the Passions of Fear, Anger, or Joy, are discernible enough in the Face) and she bearing a command, caused it to be hung up again; pouring upon her extravasated Blood a Golden shower of Pagodas, which I made my Man fish for?

#### THE PLACE OF ELECTRO-SURGERY OF TONSILS IN INDIAN PRACTICE

#### By N. AHMED

Divisional Medical Officer, East Indian Railway

ELECTRO-SURGERY of the tonsils has assumed a definite place in oto-laryngology. There are no two opinions regarding its value, at least in those cases for which ordinary surgery is contra-indicated.

On 14th December, 1938, I sent a questionnaire to practically all the teaching institutions in India, Burma and Ceylon in order to ascertain what place electro-coagulation of the tonsils has in the practice of their attached hespitals, where young medical men receive their training. The result of the investigation is given below. It has revealed a state of affairs which I consider needs attention. copy of the questionnaire is given below :-

#### Electro-coagulation of Tonsils

Diathermy or Short-Wave Machine.

Name of Hospital-

Is it done at all in your Hospital?-

3. If yes, in which department-

Radiological-

(a) Radiological—(b) Oto-laryngological—

4. Approximate number of cases treated in 1937-38.

The superintendents of the hospitals attached to 17 medical colleges and 27 medical schools were requested to supply the information:-Amongst the 17 medical colleges two of

them did not reply; ten replied 'No'.

Vizagapatam bought the short-wave apparatus in December 1938. Osmania Hyderabad said 'Yes but rarely', and gave no statistics. The Women's College, Delhi, replied 'Occasionally for tonsillar remains—none in 1937-38'.

It therefore comes to this that only 3 institutions attached to the medical colleges in India, Burma and Ceylon use electro-coagulation. They are the Grant and Gordhan Das Colleges in Bombay and the Medical College Hospitals in Calcutta. The cases they did were :-

8 in 1937 J. J. Hospital, Bombay 6 in 1937 K. E. M. Hospital, Bombay (:: 6 in 1938 Medical College Hospital, f.. 11 in 1937 8 in 1938 Calcutta.

Amongst the 27 medical schools 14 did not reply; 11 of them replied 'No'. The only two, Agra and Darbhanga, said 'Yes' but Agra treated none in 1937 and only one in 1938, while Darbhanga did 3 cases in 1936 and none in 1937-38.

This being the state of affairs in the hospitals attached to the teaching institutions it would not serve any useful purpose to probe further into the question of what other leading hospitals in India are doing in the direction of fostering and promoting the advancement of electro-surgical methods in tonsillectomy. Whatever work is done in India appears to be wholly due to the individual efforts of the specialists and the enthusiasts amongst the general practitioners.

Apart from the question of training medical students, one wonders what happens to those patients whose tonsils are in need of removal, but for whom ordinary surgery is contraindicated or to those who abhor or dread surgery and refuse it on account of the risk to their health, happiness and even life. To whom in India should go the aged, the very the tuberculous, the weak and debilitated, syphilitic, the hæmophiliacs, the invalids with serious kidney, liver, heart and pulmonary lesions, those with goitre, acute rheumasism.

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inflamed septic tonsils or infected tonsillar remnants, the very nervous, who readily agree to anything but a knife, when their tonsils are in immediate need of removal?

It is my experience that the majority of the old practitioners, and not a very small proportion of the doctors who have recently qualified, if shown a diathermy machine are

not able to say what it is.

After many years' experience, I am fully convinced of the very great scope and the extensive utility of the electro-coagulation of tonsils in Indian practice. I do not agree with those who advise against its adoption as a routine procedure. I see nothing in the method that warrants such an attitude. The only drawback, as far as the procedure itself is concerned, is its slowness, but, if a patient can afford the time, I see no reason why a doctor, who has the time, should insist on submitting him to the knife and its disadvantages and risks.

I realize the conditions that exist in big provincial hospitals. I do not blame a surgeon who is accustomed to use his knife and guillotine hesitating to adopt new methods when time is limited and the number of the patients great, but if he finds it convenient to use his knife or guillotine for reasons of his preference or the conservatism of the hospital organization and equipment, it is no fault of the coagulation and the method need not be condemned as unsuitable as a routine. I have actually experimented and found that 10 patients can be anæsthetized in half an hour, and not more than one hour would be taken for the day's coagulation of them.

The absolute limitations of the procedure are only two. Children under 6 years and the individual of any age and sex who will not open the mouth for even a few seconds for the work. During the period of six years I have seen only two such cases, a girl of 10 years and a lady of 22 years of age. The girl had

to be gagged and the lady needed patience to the point of exhaustion to get her to open her mouth and that also only on some days.

Electro-coagulation is an office procedure It is easy, convenient and safe. It is my observation that Indian patients, educated or ignorant, bold or nervous, who are generally averse to the knife, very readily take to it, appreciate it, like it and after the experience of it have nothing but praise for it. Dan McKenzie, the famous oto-laryngologist writing on the subject, remarked-

'Little or no complaint is made and his endurance is never seriously taxed. He is, in fact, to continue the treatment from start to finish without leaving his work whatever it may be.....the disappearance of the slough takes place without the patient being aware of it ..... so quiet and uneventful is the process, indeed, that even large tonsils seem

to melt away almost imperceptibly.

It is a pity that the premier hospitals are not giving a lead in using and popularizing this method, which has a great future in India.

The hospitals attached to all the medical colleges and schools in India could show a record of only 40 cases in two years in 1937 and 1938, while Dillinger in America put forward 2,200 cases of tonsils removed in 4 years by electro-coagulation and that too in 1926 to 1930.

The aim of this article is to urge the big hospitals to use the method and to let students be at least acquainted with it to the extent that they may in future be able intelligently to prescribe or actually use it for suitable cases

in their practice.

My sincere thanks are due to the authorities of the hospitals, colleges and schools who so very kindly supplied me with the required information. I have also to thank Dr. S. C. Chatterji, the Chief Medical Officer, East Indian Railway, Calcutta, for permitting the publication of this article.

# Medical News

#### TUBERCULOSIS WORKERS' CONFERENCE

THE first Tuberculosis Workers' Conference organized by the Tuberculosis Association of India was opened by Her Excellency the Marchioness of Linlithgow, the president of the Tuberculosis Association of India, in the Red Cross Conference Hall on the 20th November,

In requesting Her Excellency to open the Conference, Major-General G. G. Jolly, the chairman of the Tuber-culosis Association of India, referred to a similar Conference held five years ago under the auspices of the King George Thanksgiving (Anti-Tuberculosis) Fund, the immediate predecessor of the present Association. The present Conference was the first to be held under the new Association founded by Her Excellency. This Conference met under circumstances when the finances of the anti-tuberculosis movement had been vastly augmented by Her Excellency's Appeal

for the King-Emperor's Anti-Tuberculosis Fund. Five years ago the total amount available to combat tuber-culosis all over India was Rs. 9½ lacs, but to-day the collections had reached nearly Rs. 85 lacs. 'If the striking change in the finances of the movement against tuberculosis in India tuberculosis in India is any measure of the increased interest in the disease and of increased determination to taskle it there the to tackle it, then the position is one which must give great satisfaction to all tuberculosis workers in India. On behalf of the central committee and the delegates the chairman expressed his gratitude to Her Excellency for the honour she had paid them in coming to open the Conference. Her Excellency's presence, he said, was a demonstration of the active interest which, as president, she took in all the affairs of the Association. Her Excellency in opening the Conference said: Her Excellency in opening the Conference said:

'The Tuberculosis Association of India is the outcome of a resolution which I formed over three years go

when, on my arrival in India, I asked for information about the disease in this country. The answer which I got was such that it convinced me that there was no time to be lost in starting a campaign to bring home to the people of this country the seriousness of the position. of the position.

that to-day we are celebrating the first Tuberculosis Workers' Conference under the new Association.'

The promotion of these conferences was a function of the Central Association, and she hoped very much that they would take place at regular intervals to give the necessary opportunity for experienced tuberculosis workers from all over India to talk over points of importance with regard to the best measures of diagnosis and treatment of the disease. These discussions would be of the greatest value to the whole campaign in India by enabling the delegates of tuberculosis institutions and delegates representing other tuberculosis interests to improve their individual measures of diagnosis and treatment, and to give them new vision of some aspects of the whole tuberculosis problem.

Her Excellency wished that the Association could have offered the delegates to this Conference practical demonstrations with regard to diagnosis and treatment and hoped that when the model tuberculosis clinic in Delhi had been established it would be possible to do so at subsequent Conferences, and further expressed the hope that 'the Conference would succeed in giving to the delegates new knowledge, new experience, new vision and fresh vigour for the tremendous task that lay ahead of all of us in combating tuberculosis in

Following Her Excellency's speech, Dr. Frimodt-Möller, the medical commissioner to the Tuberculosis Association of India, in his introductory remarks referred to the rapid development in the diagnosis and treatment of tuberculosis in recent years and to the necessity for all tuberculosis workers to come together for exchanging notes, thus benefiting from each other's experiences.

'There are questions in connection with diagnosis and treatment which cannot be solved without the opportunity of personal discussion amongst the tuberculosis workers in India. Such questions are those of standardization of records and definitions of types and stages of the disease, as well as of results of treatment, as many factors peculiar to India influencing prognosis and result of treatment must be taken into consideration before adequate terms of classification, prognosis and results can be decided upon.'

In a Conference of this nature not only must diagnosis and treatment be discussed but all such questions environmental factors influencing the spread of the disease, the methods of discovering sources of infection and patients in the preclinical stage of the disease, vaccination of contacts and other important measures of prevention, all forming part of the work carried out from a tuberculosis clinic. Also other measures of prevention need discussion, as for instance the value in India of anti-tuberculosis legislation. Another series of questions to be considered were the relation of home-treatment, and institutional treatment, and treatment and institutional treatment, the care and after-care of tuberculous patients including the questions of ex-patients' colonies and village settlements'.

Over fifty delegates from different parts of India attended the Conference. Papers on 25 different aspects of the tuberculosis problem were read and followed by lively discussions during the course of the Conference which lasted for four days.

In clasing the Conference Her Excellency expressed

In closing the Conference Her Excellency expressed her satisfaction at the valuable work that had been done and at the enthusiasm displayed by all concerned. She referred to the need for frequent conferences and hoped that all concerned would soon start preparations

A summary of the papers and discussions will appear a subsequent issue of the Indian Medical Gazette.-EMTOR, 1. M. G.

#### BOMBAY MEDICAL COUNCIL

The following extracts from a summary of the proceedings of the meeting of the Bombay Medical Council held on 4th September, 1939, are published for general information:-

The Council proceeded to consider a complaint against Major Raghunath Ganesh Dani, L.R.C.P., M.R.C.S., against Major Raghunath Ganesh Dani, L.R.C.P., M.R.C.S., M.B., B.S., I.M.S. (Retd.), and Mr. Vishnu Raghunath Gosavi, L.C.P.S., regarding their running a private nursing home in Nasik designated 'Major Dani and Dr. Gosavi Maternity, Gynæcological, Surgical and Nursing Home' and issuing pamphlets, etc., and decided (i) that Major Dani and Mr. Gosavi be warned that they cannot call the nursing home after their names, vide rule 20 in section II of the Code of Medical Ethics, and (ii) that the publication of pamphlets and general distribution of annual reports is objectionable. is objectionable.

The Council proceeded to consider a suggestion made by the Executive Committee that it may be ruled that the Council will deal only with questions regarding registration, education and ethics and not with matters which concern the privileges of practitioners.

The Council proceeded to consider the reference from Government regarding the application of Mr. Ibrahim Sheikh Mohamedbhai Amin for permission to be regis-tered under section 7 (3) of the Bombay Medical Act, VI of 1912, and decided to inform Government that in the opinion of the Council Mr. Amin be given the

The Council proceeded to consider the reference from Government regarding the application of certain practitioners for the recognition for registration of their qualifications obtained between 1912 and 1916 from certain institutions not authorized to grant such qualifications under the Indian Medical Degrees Act, VII of 1916, and decided to inform Government that the Schedule to the Bombay Medical Act, VI of 1912, be amended so that those who qualified between 1912 and 1916 from the following institutions, viz-

the National Medical College, Calcutta, the College of Physicians and Surgeons of Calcutta,

the International College of Physicians and Surgeons of India, Calcutta,

be registered. The Council proceeded to consider the reference from Government regarding the recognition of the medical degrees of the Tilak Maharashtra Vidyapeeth, Poona, for registration under the Bombay Medical Act, VI of 1912, and decided to inform Government that the diploma of Ayurvidya Visharad in Allopathy granted by the Tilak Maharashtra Vidyapeeth, Poona, up to 1936 be added to the qualifications recognized as registrable in part II of the Bombay Medical Register, section B.

The Council proceeded to consider the reference from Government regarding the amendment of rule 12 of the Rules of the Council and the voting paper given in the Appendix to that rule and decided that the following amendments to the rule and the Appendix to it be approved:

I. After sub-rule (7) the following be inserted. namely:-

'(7-A) The President shall nominate as scrutineers such number of members of the Council not exceeding four, as he thinks fit.'

II. In the voting paper in the Appendix-

(1) The first column shall be deleted; (2) (a) For the word 'Registrar' occurring at the right hand bottom corner the words 'Returning Officer'

shall be substituted; and
(b) For instruction '4' the following shall be substi-

'4. The elector shall enclose the voting paper in a small blank cover and then enclose that cover in a bigger cover in the left hand lower corner of which the elector shall write his full name and signature. If the elector fails so to write his full name and signature the voting paper shall be invalid.'

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The Council proceeded to consider and approved an

The Council proceeded to consider and approved an amendment to the travelling allowance rules of the Council so as to enable them to pay travelling allowance to members of Sub-Committees, etc., appointed by the Council or the Executive Committee.

The Council proceeded to hold an inquiry into the charges laid against Mr. Vishwanath Hari Bedekar, M.B., B.S., viz, (a) that he is conducting the birth control research bureau at 166A, Vincent Road, Dadar, where advice and treatment are provided in regard to the question of birth control and that treatment is given in the form of pills placed on the market by the Aryan Pharmacy, Vile Parle, in bottles labelled A. P. Brand B. U. C. and packed in boxes, (b) that he is thus using a secret remedy and associating himself in the manufacture and sale of a proprietary medicine and (c) that in relation thereto he has been guilty of infamous conduct in a professional respect, and it was infamous conduct in a professional respect, and it was decided that Mr. Vishwanath Hari Bedekar had been guilty of infamous conduct in a professional respect and the Registrar was directed to remove Mr. Bedekar's name from the Medical Register.

The Council proceeded to deal with the notice of a motion proposed to be moved by Mr. U. B. Narayanrao, L.C.P.S., to the effect that the courtesy title of 'Dr.' be used while addressing registered medical practitioners in all official correspondence but the President

ruled the motion out of order.

ruled the motion out of order.

The Council then proceeded to deal with the notice of a motion proposed to be moved by Mr. U. B. Narayanrao, L.C.P.S., seconded by Mr. V. D. Sathaye, B.S., L.C.P.S., to the effect that Government be requested to reconsider its decision regarding the continuation of the Bombay Medical Register in three sections as at present and to approve the previous resolution of the Council regarding the amalgamation of the three sections together and the motion was carried by a majority.

by a majority.

The Council proceeded to deal with the notice of a motion proposed to be moved by Mr. U. B. Narayanrao, L.C.P.S., seconded by Mr. V. D. Sathaye, B.Sc., L.C.P.S., to the effect that any qualification which is registrable and which is acquired without examination should have '(Hon.)' inserted after it in the Bombay Medical Register and the motion was carried by a majority.

by a majority.

The Council proceeded to consider the request of the Bombay blood transfusion service for the nomina-tion by the Council of one of their members on the Committee of the Service and decided to appoint Mr. C. A. Amesur, M.S. (Lond.), M.R.C.S., D.L.O., as the

nominee on the Committee.

The Council then proceeded to consider the question of appointing Visitors to attend and be present at the

Bombay University Medical Examinations and appointed Dr. Jivraj N. Mehta, M.D., M.R.C.P., etc., and Dr. P. C. Bharucha, M.D., B.S., as Visitors for the Examination in Medicine, the President (Major-General H. C. Buckley, M.D., F.R.C.S., K.H.P., I.M.S.), and Mrs. Tarabai Kotamraj, L.C.P.S., as Visitors for the Examination in Midwifery and Gynæcology, Mr. C. A. Amesur, M.S., M.R.C.S., D.L.O., as a Visitor for the Examination in Surgery, and Mr. C. J. Ghia, L.M. & S., M.L.A., and Mr. V. D. Sathaye, B.Sc., L.C.P.S., as Visitors for the Examination in Ophthalmology.

The Council proceeded to consider the reports of the Visitors to the examinations in Surgery, Midwifery Medical Examinations University Bombay

Visitors to the examinations in Surgery, Midwifery and Medicine of the College of Physicians and Surgeons of Bombay and decided that the attention of

the College be drawn to the remarks of the Visitors.

The Council proceeded to consider the request of the manufacturers, manufacturers' agents and importers of pharmaceutical and toilet preparations, Bombay, for of pharmaceutical and tollet preparations, Bolinbay, for the nomination by the Council of one member on the Board proposed by them to be formed to decide on the classification of spirituous preparations and the ques-tion of exemption of any preparations from the operation of the proposed prohibition legislation and it was decided that no member be nominated by the Council on the proposed Board.

The Council proceeded to deal with a motion made by Mr. U. B. Narayanrao, L.C.P.S., seconded by Mr. V. D. Sathaye, B.Sc., L.C.P.S., regarding the appointment of Visitors to attend and be present at the L.M.S. Examination to the Medico-Surgical College at

Nova Goa and the motion was lost.

The Council proceeded to deal with the notice of a motion proposed to be moved by Mr. V. D. Sathaye, B.S., L.C.P.S., regarding (1) the deletion of certain qualifications such as L.C.P.S. (Bom.), L.S.M.F. (Bengal), L.S.M.F. (U. P.), etc., from the Schedule to the Bombay Medical Act, 1912, with a specified reservation in favour of those qualified before such alteration and the students who have already com-menced their medical studies and (2) the appointment of a Committee to inspect the courses of studies or the L.C.P.S. Bombay examination and the facilities for the same at the Medical Schools and the motion was

The Council proceeded to consider the appointment of the Registrar of the Council and the applications of the Registrar of the Council and the applications received for the post and appointed a Sub-Committee of Lieut.-Col. S. L. Bhatia, M.C., M.A., M.D., I.M.S., Dr. B. G. Vad, M.B., B.S., M.D., and Dr. Jivraj N. Mehta, M.D., M.R.C.P., etc., with instructions that the Sub-Committee's recommendations be circulated to the members of the Council and the result thus reached be forwarded to Government for approval.

# Current Topics

#### Medical Treatment of Mustard Gas Casualties

(Abstracted from the Air Raid Precautions, Handbook No. 3, 1st edition, London, His Majesty's Stationery Office)

IWe do not believe that the towns of India will ever be subjected to raids by enemy aircraft. Should such an unexpected event occur and high explosive bombs

an unexpected event occur and high explosive bombs cause casualties amongst our people, many medical men, by the application of their general surgical knowledge, will be able to meet the situation, though special knowledge on the subject would be very valuable.

However, as the casualties caused by mustard gas are so far removed from our normal experience, and as the knowledge of how to deal with such casualties, which would be so vital in the unhappy event of this form of warfare being resorted to, cannot be acquired from ordinary medical or surgical textbooks, we feel

justified in devoting a few columns in this and in our next issue to this subject.

Those who feel that they would like further informa-tion on the treatment of air raid casualties are referred to the series of handbooks from which this abstract is taken, or to the pamphlets issued under the auspices of the Indian Medical Association by their able and energetic secretary, Dr. S. K. Ray, in which a useful résumé of these handbooks is given, or to the book reviewed in our July issue Medical Organization and Surgical Practice in Air Raids, by P. H. Mitchiner.—Editor, I. M. G.]

#### Nature of Casualties from Mustard Gas Vapour

MUSTARD gas vapour can be harmful in concentrations that may not be readily noticed by the sense of smell; also, the sense of smell for mustard gas vapour tends to become dulled quickly, in which case the danger may no longer be appreciated. danger may no longer be appreciated.

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The cumulative effect of repeated small doses of the vapour is another insidious danger.

The vapour concentration necessary to produce effective results need not be of a high order. One hour's exposure to a concentration of one part of mustard gas vapour in one million parts of air is sufficient to incapacitate an unprotected man for about

two weeks, through conjunctivitis.

In the event of a mustard gas attack on a large town some persons who have actually been exposed to the gas may, owing to local conditions, be unable to get away from their places of business before the inflammation of the eyes has become severe. If for inflammation of the eyes has become severe. If for that reason they can no longer see they should be treated like blind persons and should be conducted to the first aid post, the hospital, or their homes, as the case may be. The personnel of the Voluntary Aid Organizations should be prepared to give their assistance in such cases, and it need only be pointed out that if this type of casualty is numerous it is possible to collect a small number of them into a party, each man holding on to his neighbour, when a single guide can lead the whole party.

'The possibility of the odour of mustard gas being

masked by smokes or the fumes from high explosive, and its lack of immediate sensory irritation in what

are yet effective concentrations, are additional dangers.

The degree of severity of mustard gas vapour casualties naturally varies with the concentration and the period of exposure. The least severe case may only show light conjunctivitis, with almost no erythema of the skin and only a slight hoarseness of the voice; the most serious, on the other hand, may present a picture of the most profound illness, usually with widespread skin burns, severe eye effects and damage to the respiratory tract.

A moderately severe case of exposure to the vapour when quite unprotected will present a typical appearance in 24 hours, with eye symptoms predominating; general reddening of the skin occurs, most marked in the reddening of the skin occurs, most marked genital region where the excoriation of the skin may cause distressing irritation, while, at about the same time, the respiratory system begins to show signs of involvement by a partial loss of voice and by a

troublesome cough.

In the last war, the death rate among well disciplined troops with effective respirators was low, approximately 2 per cent of the mustard gas casualties, but the death rate among those without the protection afforded by a satisfactory respirator was much higher. Fatal cases were almost unknown within the first 24 hours after exposure. Death occurred at any date from the second or third day in the most severe cases to the third or fourth week in the more lingering ones, the highest death rate being at the end of the third or fourth day after exposure; and almost all the deaths were due to secondary broncho-pneumonia

The main features of mustard gas vapour casualties

may be briefly summarized as follows:-

(a) An insidious onset, with a latent period of two to forty-eight hours according to the concentration of the gas and the duration of exposure.

Injury to the eyes, varying from simple conjunctivis of a temporary nature to a severe keratitis and

secondary septic complications of grave character.

(c) Laryngitis, involvement of trachea and bronchi, and possibly necrosis of the mucous membrane, leading to severe bronchitis or broncho-pneumonia

(d) Early nausea, or persistent vomiting, accom-

panied by epigastric pain.

(e) Erythema of the skin—early in the case of exposed areas or of hot, moist surfaces—which may proceed to vesication, and excoriation and may be followed by secondary septic infection.

(f) Slow healing of the blistered, devitalized areas and pigmentation of the ensuing scar.

The types of injury which might result from exposure

The types of injury which might result from exposure to mustard gas vapour are summarized below.

#### (1) ACTION ON THE EYES

The eyes are usually the first to show signs of the irratant action of mustard gas vapour. Even so the visible onset of injury may be long delayed, the latent period varying from two to forty-eight hours, according to the dosage; but, once established it usually develops with rapidity. The initial symptoms of smarting and irritation are soon followed by leak worst in irritation are soon followed by lachrymation, pain in the eyes and headache; swelling of the eyelids quickly supervenes and may be so extreme as to close com-pletely the palpebral fissure, while the simple lachrymation becomes muco-purulent as a result of secondary infection, and blepharospasm and photophobia marked.

Changes in the eyeball itself are equally rapid; the injection which marked the onset of ocular signs is followed by swelling and ædema, to such an extent that the conjunctiva at the intrapalpebral aperture may even project between the eyelids, forming a characteristic yellowish-white, opaque band on either side of the cornea. A similar swelling of the palpebral conjunctiva under the eyelids may produce two chemotic folds which add to the distressing appearance of the

eye by projecting between the lids.

The cornea, in the early stages, is grey and hazy, the haziness fading off above and below where partial projection is given by the eyelids; its surface becomes blurred and lustreless and later exhibits a typical 'orange skin' appearance. Exfoliation of the corneal cells may occur and in the presence of trauma ulceration may follow which, if complicated by secondary infection, may lead to permanent opacities and impairment of vision.

In serious cases, the condition of the cornea calls for the most careful and regular examination—a difficult procedure in view of the intense photophobia and blepharospasm. Recovery is slow; the ædema gradually subsides and the corneal epithelium begins to regain its lustre; gradually a condition is produced which is the exact opposite of the original appearance that is to say, the inter-palpebral area previously a dead white is now once more vascular and goes through a period of injection, whilst the previously injected areas, protected by the eyelids, are regaining their normal

In the absence of corneal ulceration or conjunctival adhesions no permanent after-effects are usually with, but lachrymation and photophobia are liable to persist for some time, and neurasthenic conditions may supervene in susceptible individuals.

The experience of the last war, when eye casualties were produced by the vapour more often than by a direct splash of the liquid, showed that eye injuries fall

into three main groups:-

(a) Mild cases, 75 per cent of the total, fit for duty, on an average, in two weeks.

(b) Intermediate cases, 15 per cent, recovery in four

to six weeks.

(c) Severe cases with corneal changes, about 10 per cent recovery in two to four months. Of these only a very small minority sustained total loss or impairment of vision.

#### (2) ACTION ON THE RESPIRATORY TRACT

The toxic effects of mustard gas vapour on the respiratory tract are shown by an early rhinitis (almost simultaneous with the onset of the conjunctivitis), accompanied by sneezing and the discharge of a profuse watery secretion, soon to become muco-purulent.

The larynx is usually affected early, and hoarseness or aphonia is frequent. The laryngitis may be mild if exposure has been limited to a low concentration, but edema and even sloughing of the vocal cords may

follow exposure to a high concentration.

In a severe case, the laryngeal inflammation tends to be reproduced in the trachea and bronchi, when the dry irritating cough, originally complained of at the onset of the laryngitis, is replaced by a loose cough accompanied by profuse muco-purulent expectoration and pain behind the sternum. A rising temperature and pulse indicate the onset of a severe bronchitis which may be complicated by sloughing of the inflamed tracheal mucous membrane; secondary infection of the latter soon leads to the development of a broncho-pneumonia with cyanosis. Rarely, abscess of the lung, bronchiectasis, or even gangrene of the lung may occur not as a direct result of the gassing by mustard gas vapour, but of the secondary bacterial invasion which follows.

In the great majority of cases, however, the lesion is confined to a bronchitis which clears up in the course of a month or six weeks, leaving no after-effects.

#### (3) ACTION ON THE SKIN

Before describing the effects of mustard gas vapour on the skin it may be useful to mention some of the factors that influence the penetration of the gas or

modify the severity of its action.

As in the case of liquid mustard gas, the vapour owes its penetrative powers to its ready solubility in the lipoid constituents of the skin. The degree of skin busing which follows in accompanied of the consequence. burning which follows is accentuated if the exposed skin area be a highly sensitive and tender region such as the scrotum, or if it be a surface which is subjected to constant friction, as is the case in the neck, the wrist and the ankles.

If the exposed skin surface be bare, the attack of the vapour will be direct, and the result more rapid than if the skin be clothed. This temporary protection of clothed areas is due to the fact that ordinary porous clothing material absorbs the vapour and retards its access to the skin; but if such clothing be worn beyond the period of actual exposure, or if the exposure be prolonged, the vapour retained by the clothing will increase the severity of the resulting skin burns.

increase the severity of the resulting skin burns.

This temporary protection varies in duration according to the nature, texture, thickness and degree of humidity of the clothing. Thus, a thin openwork cotton garment in close apposition with the body surface will not greatly retard the access of the vapour to the skin, whereas thick close-woven material, such as serge and woollen clothing generally, will definitely do so, and may even save the area from burns provided it be discarded on leaving the contaminated area.

discarded on leaving the contaminated area.

After the lapse of the usual latent period, which may vary from two to forty-eight hours after exposure to the vapour of mustard gas, an erythematous blush appears over the affected area and gradually deepens in intensity until the skin looks scorched. This redness is not unlike the eruption of scarlet fever, and is usually accompanied by only a slight degree of irritation. The erythema is most marked on the skin areas which are hot and moist; dense tissues like the scalp, the palm

not and moist; dense tissues like the scalp, the palm of the hand or the skin of the heel usually escape unless the concentration of the vapour be high and localized to that area, as, for example, from drops of liquid mustard gas on a cloth cap.

The affected area soon begins to show superficial blistering in the form of small vesicles which rapidly coalesce to produce large blisters full of a clear, yellow serum; on evacuating this fluid and removing the overserum; on evacuating this fluid and removing the overlying epithelium, a raw, red, weeping surface is exposed. As a rule vesication is complete by the second day, but blisters may appear in crops for days following exposure, even though all contaminated clothing was discarded at an early stage. Systemic disturbance is absent, unless the burns are extensive and severe; interference with sleep, however, may be caused by the distressing itching which may accompany the developing burns. Very mild cases may show simply erythema, followed later by pigmentation with scurfy desquamation, the 'blister' stage being absent.

In severe cases the erythema may deepen to a dusky, almost violet tint, ædema of the skin is marked, and serum; on evacuating this fluid and removing the over-

In severe cases the erythema may deepen to a dusky, almost violet tint, cedema of the skin is marked, and blisters appear in the dark background overlying a deep red or hæmorrhagic base. Such blisters progress slowly, and are very prone to sepsis owing to the serious devitalization of the tissues; ulceration is liable to spread beyond the limits of the blister, and healing is very slow. If sepsis occurs it adds to the severity and duration of all lesions; the necrosed tissues form an excellent medium for pathogenic organisms, and death may result if extensive or deep burns are thus affected.

may result if extensive or deep burns are thus affected.

The healing of an uncomplicated vapour burn is more rapid than one due to liquid mustard gas, but a common feature of all mustard gas burns is the long

time they take to heal. The chemical irritant seriously damages the vitality of the affected tissues, and all

processes of skin repair are delayed.

The healing stage is characterized by a brownish or coppery pigmentation of the epithelial layers in the areas previously affected by the erythema. This staining, however, is superficial, and usually disappears with the normal desquamation of the superficial layers of

As a rule, after-effects are absent, and the scars resulting from vapour burns are shallow, but a chronic eczematous condition or a generalized furunculosis may, rarely, follow such burns and prove obstinate to treatment.

#### (4) OTHER EFFECTS OF MUSTARD GAS VAPOUR

Apart from its direct action on the eyes, the respiratory organs and the skin, mustard gas vapour may indirectly, and mainly owing to secondary infection, produce signs and symptoms in more remote organs of the body:—

(a) Alimentary tract.—It has already been mentioned that an early nausea, or even vomiting, accompanied by epigastric pain, often occurs in vapour poisoning by mustard gas. This effect is due to the swallowing of saliva or nasal secretion impregnated with the gas. Although it may prove obstinate during the first day, it rarely persists for more than 48 hours; similarly, the accompanying epigastric pain is of short duration, and the intestines are not usually affected. There are no lasting after-effects, but a functional condition of persistent nausea or vomiting has been observed occasionally.

Urinary tract.—Traces of albumin have been found in the urine of early fatal cases, most probably due to congestion from circulatory weakness and not as a result of the action of the gas on the kidneys. It is only in the late stages of fatal cases, and particularly in those instances where widespread septic burns have occurred, that renal complications have been noticed, such as an acute hæmorrhagic nephritis. Pain on micturition, however, and even retention of urine may result from a local ædema and vesication of the penis.

(c) Circulatory system.—Blood changes are not met with, and any alteration in the leucocyte count is due either to pneumonic complications or to sepsis of the skin burns. Apart from the effects of the general toxemias of pulmonary sepsis no primary changes occur in the cardiac mechanism, but a functional condition of disordered action of the heart is not uncommon as a result of the gassing.

#### Nature of Casualties from Liquid **Mustard Gas**

The great majority of mustard gas casualties in the last war were caused by exposure to the vapour emanating from collections of the liquid deposited by shells. Aircraft bombs, owing to their different methods of construction, can contain more liquid gas than shells of the same total weight, and in addition aircraft can discharge liquid mustard gas as spray. Casualties in future wars may therefore be of more serious types caused by contamination by the liquid itself.

Casualties from the liquid may result in the case

(i) persons in the open under falling spray; (ii) persons near enough to the burst of a bomb to receive direct splashes of the liquid; and

(iii) persons who touch material objects which have splashes of the liquid upon them.

The types of injury which might result are

summarized below.

#### (1) Skin burns due to the liquid

(a) On bare skin.—Although liquid mustard gas is a direct irritant to the skin, the sensory irritation is not immediate; its high lipoid solubility enables it to penetrate tissues rapidly, but hours may elapse before the clinical signs make their appearance.

Penetration is rapid, and this rapidity is enhanced by an elevated temperature of the skin, or under

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fore nced niler hot weather conditions. Indeed, there is reason to suspect that constant exposure to heat as in tropical or semi-tropical countries, leads to the acquisition of some degree of sensitivity to mustard gas.

The initial signs and symptoms of a typical mustard gas burn are an erythema at the site of contact, often accompanied by some itching; the capillaries become engorged, and cedema, with thickening of the skin supervenes. The erythema deepens, and in severe cases may even assume a livid hue; a pale, parchment-like area makes its appearance in the centre of this erythematous zone, and a vesicle, tensely filled with clear, yellow serum, gradually forms. This vesicle is the result of an inflammatory exudation of fluid which may continue for several days, according to the depth of penetration of the liquid mustard gas; the exudate, however, contains no actual mustard gas.

If the liquid contamination of the skin be widespread, as in a smear or splash, the erythema is followed by the appearance of numerous small vesicles which gradually coalesce to form large blebs, the underlying area being raw and cedematous; such blisters may continue to develop in crops for several days after

contamination.

There is no evidence that any of the liquid mustard gas finds its way into the general circulation. Apart from the itching—which may be most severe where warm moist parts of the body are affected-there is little or no irritation except some stinging while vesication is developing, and no pain follows the appearance of the latter. The danger of sepsis following, however, is a real one, especially if the blistered area be extensive, as the tissues affected are devitalized, and the blood supply is impaired.

In the absence of secondary infection no constitutional disturbance is usually noted, and primary shock is absent. Healing, however, is a slow process (partly because the blood supply has been damaged, and partly on account of residual mustard gas or its derivatives persisting in the tissues). The resulting scar, which is soft and pliable, often assumes a coppery pigmentation which disappears after a time.

(b) On clothed skin.—Drops of liquid mustard gas on clothed areas of the body act by virtue of the high concentration of vapour evolved, the warmth of the underlying skin naturally assisting the process. A gross contamination of the clothing, on the other hand, such as may be produced by splashes or by accidental spilling, may result in actual contact of the liquid with the skin, when the action of the vapour would be super-

added to that of the liquid.

All ordinary clothing is pervious to liquid mustard gas; but it is obvious that penetration will be much more rapid in the case of the single thin cotton garment of tropical and sub-tropical countries than with the multiple layers of woollen clothing worn in temperate

climates.

If the garments be damp or wet, small drops of liquid mustard gas will rapidly penetrate and burn the skin. Although no reasons can be given for this, it has been proved experimentally to be an accurate statement of fact.

#### (2) EYE BURNS DUE TO THE LIQUID

Contamination of the eye by spray or splash represents one of the gravest dangers to which the body can be subjected in the presence of liquid mustard gas as permanent damage will result

gas, as permanent damage will result.

The degree of discomfort which immediately follows contact of the liquid with the eye may be slight, and usually subsides; symptoms often commence within half-an-hour, however, and within an hour or two the eye is inflamed and the eyelids are swollen and painful.

The clinical signs are ushered in by profuse lachrymation and conjunctivitis, and the condition develops with great rapidity. The eyelids become painful, swollen and greatly thickened by ædema, the palpebral conjunctiva is red and ædematous and the cornea develops opacities, while the ocular conjunctiva befomes congested and shows signs of ulceration.

Intra-ocular tension is increased, pain and headache are severe and a muco-purulent secretion exudes from the closed eyelids. Photophobia and blepharospasm may be extreme, and great difficulty is encountered in examining the swollen and painful eye.

After actual liquid mustard gas contamination of the large areas of the conjunctiva may readily be shed, and partial or complete loss of vision result from

the extensive ulceration and subsequent scarring.

Persons who have suffered from severe liquid contamination of the eye are liable to a recurrence of the symptoms on the slightest abrasion even up to 20 years later. This is probably due to the devitalized condition of the eye.

#### Observations on Five-day Quinine Treatment of Malaria

By J. P. SANDERS, M.D.

and

W. T. DAWSON, M.D.

(From The Southern Medical Journal, Vol. XXXII, July 1939, p. 693)

The present work had its origin in a conversation between us in 1930. We were discussing the possibilities of research in general practice. We recalled that Sir James Mackenzie had said that there was much research that could be done only by the general practitioner, and that it was frequently the common conditions about which information was lacking. led to consideration of malaria, that being one of the common diseases of large parts of Louisiana and Texas.

It was felt that only the treatment of malaria was susceptible of study with the resources available. had been taught that the best mode of treatment of malaria was to give 10 grains (0.6 gram) three times daily for three or four days followed by 10 grains daily for cight weeks. We did not be the state of the sta daily for eight weeks. We did not know of any note-worthy opposition to this plan of treatment, which was, and, so far as we know, still is, the only plan of treatment of malaria endorsed by the National Malaria Committee. In fact, the only departures from such a plan, that we were aware of, took the form of using at least initially even larger doses of quinine, 45 to 60 grains (3 to 4 grams) or even more daily. In spite of the fact that no group of malariologists has in recent years advocated even the initial treatment of malaria with larger doses of quinine than 30 grains (2 grams) daily, many physicians are probably using daily dosage much in excess of that figure. In connection with these studies, with the kind assistance of Dr. E. L. Sanderson, Superintendent, data were obtained by a group of co-operating physicians on 189 patients with malaria, treated in the Shreveport Charity Hospital during 1937; 65 were started on 10 to 20 grains daily, 84 on 30 to 40 grains daily, and 40 on 60 to 90 grains daily (table I). The reason for favouring large doses initially has been to bring the fever under control as soon as possible. But in the fever under control as soon as possible. But in the roup of 189 cases mentioned there was no significant difference among the immediate results obtained at the three dosage levels. One may say that, so far as information is available, treatment with over 30 grains daily appears to add nothing, and involves unnecessary expense, discomfort, and with the highest daily dosages some danger of nephritis, amblyopia or even the possibility of fatal quinine poisoning. Sollmann states that the fatal dose of quinine is usually given as 8 grams (125 grains), though 30 grams has been

High dosage with quinine is very disagreeable to many patients, and the long-continued use of any drug is difficult to secure when the patient already well, as is usually the case after a few days' quinine treatment of malaria. We were, therefore, led to consider, a test of a very short course of treatment. We settled on 10 grains (0.6 gram) daily for four days,

#### TABLE I

Influence of daily dosage of quinine on duration of fever (99°F, or over) after initial dose of quinine. Hospital patients

	BENI	IGN TER	TIAN	ESTIVO-AUTUMNAL			
Duration of fever in hours	f Daily quinine dosage in gra						
	10-20	30-40	60-90	10-20	30-40	60-90	
72 or less 24 or less 48 or less	10 14 15	9 11 12	5 9 10	13 18 25	12 21 24	9 15 17	
TOTAL	15	12	10	25	24	17	

and work was done for several years chiefly on

quinidine Quinidine was brought into the picture because tients with quinine idiosyncrasy may tolerate quindine, and we were interested in the possibility of using quinidine as a quinine substitute in malaria. In trying to obtain from the literature information about the antimalarial value of quinidine, we found that the Madras Cinchona Commission of 1866-68 had Madras Cinchona Commission of 1866-68 had employed all four common cinchona bases extensively in treating malaria. Through the kindness of Mr. Bernard F. Howard, of Messrs. Howards and Sons, Ilford, England, a copy of their report was obtained. The most striking thing to us in this report was the subreport of Assistant Apothecary Wade, who treated 284 cases with quinine, 300 with quinidine, 'each dose being invariably taken in my presence'. Wade found that with either quinine or quinidine, in 88 cases out of 100, one dose (usually of 10 grains) sufficed to end the fever, about 11 per cent required a second dose and less than 1 per cent required any further treatment 'to abate the fever', which often remained absent for 'to abate the fever', which often remained absent for a long time. This work was, of course, done prior to the discovery of the malarial parasite. For a controlled study of the effects of a single day of quinine treatment, the reader is referred to the recent paper of Boyd and Kitchen. Reading over Wade's report, it seemed to us justifiable to try a single 10-grain dose daily for four days, and repeat treatment as needed. Nevertheless, it was an anxious time at first; an amount so small as this seemed altogether insufficient to control an illness so severe in some instances; the patients were anxiously watched; but both quinine and quinidine soon demonstrated a remarkable potency in this small dosage even in patients who seemed desperately ill. Later the dose was given twice a day, but not because of accidents, rather because it was feared that an occasional case might need twenty grains

daily.

It was a surprise to us when the League of Nations Malaria Commission recommended in quinine treatment of malaria 15 to 18 grains daily for 5 to 7 days. We had not known that others were experimenting

We had not known that others were experimenting along the same lines.

Up to the end of 1935, 1,349 cases had been given quinidine treatment, and only 81 quinine. During the past two years work on quinine has been resumed, and a more extensive comparison made of quinine and quinidine. It is well known there are strain differences in response to treatment. Thus, in India quinine has appeared very effective in terminating attacks of falciparum (estivo-autumnal) malaria, but quinine treatment has proven not nearly so successful against. treatment has proven not nearly so successful against some Italian strains of the same parasite. Our experience is that either quinine or quinidine treatment has been very satisfactory against such strains of malarial parasites as are met with around Shreveport, Louisiana, and in the few malaria parasity has not in t and in the few malaria patients hospitalized in the John Sealy Hospital in Galveston, where malaria is not endemic.

#### TABLE II

Follow-up on 46 non-hospitalized patients given short quinine treatment for malaria in the fall of 1936

Daily dose in grains	For days	Num- ber of cases	Relapsed * in 1936	Relapsed * in 1937	Relapsed *
10 20	5 5	23 23	3 1	6 3	4 5

\* Reinfection cannot be excluded.

#### TABLE III

Follow-up on 349 non-hospitalized malaria patients given 20 grains daily for 5 days for malaria in 1937

Smear diagnosis	Treated	Relapsed * in 1937	Relapsed * in 1938
Benign tertian	97	33 (28%)	19 †
Estivo-autumnal	117	22 (23%)	8 †
Negative	135	5 (4%)	16 †

\* Reinfection cannot be excluded. † Follow-up included 324 of 349 1937 cases.

Patients treated with short courses of quinine, repeated as needed, in most cases appear, as with quinidine also, to require very little subsequent treatment (tables II and III). There seems, moreover, little difference in effect of 10 and 20 grains daily in this respect (table II). The actual percentage of this respect (table II). The actual percentage of relapses we cannot determine, since the patients treated continue to reside in the area in which they contracted malaria; it is, however, considered not heavily infected. We may reasonably estimate the percentage of relapses within a year as about 25 to 45 per cent, which actually includes clinical attacks of malaria during the rest of the year, during which the first course of treatment was given, and during the following year, except that for 1938, data are not given beyond 15th October. Almost the whole of the malaria season (May to October, inclusive) for this region is thus (May to October, inclusive) for this region is thus included. The estimated relapse percentages are probably too high rather than too low, especially as patients showing at clinical relapse a negative blood smear, or a different species of parasite from the initial infection were counted as relapse cases.

The repetition of the short course is effective; the parasites do not appear to become tolerant drugresistant or 'host-resistant'. Whether or not this is because the courses of treatment given are very short, we do not know. The Malaria Commission of the League of Nations in its fourth general report is said to state with regard to quinine treatment that 'ill effects may accur when treatment is unrecessarily effects may occur when treatment is unnecessarily

protracted

Examination of table III reveals a very interesting fact about the group of patients with negative blood smears, the so-called 'clinical malarias'. The number of relapses in this group is significantly less than in either the benign tertian or estivo-autumnal group. This is probably due, in the light of Bispham's report, to the fact that many of the 'clinical malarias' did not have malaria. have malaria.

#### DISCUSSION

Our results are in general similar to those obtained in Europe, as set forth by Hackett. The results of our investigation of the effect of a 5-day treatment of malaria with quinine sulphate 10 or 20 grains cylly for 5 days are briefly: (1) that the fever is subdued

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as rapidly as by larger dosage, (2) that the percentage of relapses within a year may be estimated at 25 to 45 per cent. We have seen no reason to doubt that Bass is correct in calling for not over 30 grains daily in the beginning of treatment. With regard to duration of treatment, whether to advise continuance of 10 grains daily for eight weeks after the fever has subsided, or to advise stopping treatment at the end of 5 to 7 days, and resuming only if relapse occurs, we have nothing from our own data to guide us. After due consideration we rejected the plan of comparing the long treatment directly with the short treatment, because we could not feel sure that the patients on the long treatment would really continue to take the drug. We can only refer to the publications of the Malaria Commission of the League of Nations and to the excellent summary of Hackett, who favour the short treatment repeated as necessary. Hackett states that when this was tried in Sardinia on 300 nonhospitalized cases, the relapse rate after the long treatment was 40 per cent and after the short 46 per cent. 'It certainly did not compensate for the extra labour and expense involved in bullying apathetic villagers into swallowing quinine daily for two months.

#### Conclusions

(1) Relpases within a year following treatment of malaria with 20 grains quinine sulphate daily for five days are estimated as 25 to 45 per cent.

(2) The immediate effect against malarial fever of 10 to 20 grains quinine daily appears as good as that

of larger doses.

(3) It is recognized that there are strain differences in response to quinine treatment; hence these conclusions apply strictly only to the area in which the work was done; but trial of the short course quinine treatment in other parts of the United States seems entirely inclificable. justifiable.

#### Complications following the Use of Ergotamine Tartrate Their Relation to the Treatment of Migraine

Headache

By THEODORE J. C. VON STORCH, M.D. (Abstracted from the Journal of the American Medical Association, Vol. CXI, 23rd July, 1938, p. 293)

In the past five years ergotamine tartrate has been used by an increasing number of physicians as an effective means of aborting or terminating migraine headache. More than 300 cases have been reported in which its use has given prompt relief in approximately 90 per cent of the patients. Many of these patients have continued to use ergo amine tartrate over long periods of time. periods of time. Possible development of ergotism from such prolonged use has been a source of some concern. Accessory symptoms following the administration of ergotamine have occasionally alarmed practitioner and patient alike. Several recent reports of gangrene or death following the use of ergotamine tartrate in conditions other than migraine have tended to increase this anxiety. To date not a single case of gangrene following the following the use of ergotamine tartrate in migraine has been reported despite the fact that the literature contains references to more than 300 cases in which it has been used.

has been used.

Analysis of the literature reveals that overdosage, sepsis, obliterative vascular disease and associated cardiovascular disease have played an important rôle in the production of the ill effects attributed to the use of ergotamine tartrate. Death occurred in only one case unassociated with any of these factors. In that case ergotamine tartrate had been administered into the auterine wall during a Cæsarean section. Gangrene followed by spontaneous recovery occurred in three cases. Two were considered to show signs of impending gangrene. In the remaining two cases of impending gangrene. In the remaining two cases symptoms merely developed which unduly alarmed the physician. Many patients appeared to have a pre-existing vasospastic tendency. Despite the presence of significant predisposing factors in the majority of cases, there remain a few cases in which, from the reported evidence, ergotamine tartrate must be con-sidered responsible for the ill effects that followed its use.

Since there are no figures available with regard to the number of cases in which erogtamine tartrate has been used without untoward sequelæ, the percentage of such sequelæ may be only roughly estimated. However, such an estimate must be attempted in order that the number of accidents reported does not assume an undue importance. Judging from the amount of ergotamine tartrate dispensed in recent years for use in migraine headache, it is probable that at least several thousand patients have used it in America alone. In the past twenty years ergotamine tartrate has been dispensed in enormous quantities for use in obstetrics, gynæcology and treatment of the thyrotoxicosis. In total, these cases could conservatively be estimated to un into the hundreds of thousands over this period. Therefore, the percentage of accidents over twenty years must be considerably less than 0.01 per cent (1 in 10,000). None of these accidents have occurred in the treatment of migraine headache.

#### CLINICAL OBSERVATIONS

In the past five years 550 patients with a presenting complaint of recurrent headache have been investigated by my associates and myself. About 430 of these patients were suffering from migraine headache. The diagnoses were established on criteria previously presented. All patients were suffering from recurrent headaches, and all presented at least two of the following three criteria: associated nausea and vomiting, visual symptoms, migraine headache in the immediate family. The group includes many of the so-called allergic, endocrine, gastrointestinal, hemicranial, menstrual, ocular and ophthalmic types and a few trigeminal and neuralgic varieties.

Of this group 189 unselected patients were treated by means of ergotamine tartrate. There were 159 females and thirty males. Regardless of type or presumed etiology 90.4 per cent of the patients were relieved of one or more attacks by one or more

administrations of ergotamine tartrate.

Many of these patients have now used ergotamine tartrate in varying amounts from one to five years. Not many have been as faithful in keeping adequate records. Twenty patients who have kept adequate records were selected for presentation. These patients records were selected for presentation. These patients are those who have consistently taken the largest doses over the longest periods of time.

In none of these twenty patients have ergotism developed. As yet, there has been no evidence of ergotism in any of the 189 patients treated with ergotamine tartrate. No cases have been reported by other physicians using the drug in the treatment of migraine headache, nor have the American distributors of ergotamine tartrate been notified of any ergotism following its use in migraine headache.

A question of ergotism was raised in several of the cases. Repeated examination in these cases failed to reveal any evidence of acute or chronic ergotism and in all the use of the drug has been resumed without subsequent ill effect. In several of these, the suspected symptoms were discovered to have been present for several years before the use of ergotamine tartrate.

Although ergotism has not developed in these cases, accessory symptoms are frequent and occasionally disquieting. It is these symptoms which alarm the patient and physician. Some are identical with the symptoms of early ergotism. These require immediate symptoms of early ergotism. investigation. A few suggest special sensitivity of certain organs or organ systems and may constitute warning of impending disaster. The majority are merely unpleasant concomitants.

Accessory symptoms associated with ergotamine tartrate therapy occur most frequently after its intra-venous injection and less so after subcutaneous or intramuscular injection; they are infrequent when it is

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given sublingually and least, frequent when it is orally ingested. Unfortunately, the degree and rapidity of relief from headache vary in the same order, being most complete and rapid after intravenous injection and least so after oral ingestion.

The most commonly observed accessory symptoms are, in order of their frequency, nausea, vomiting, numbness or tingling of the hands and/or feet, muscle pains and stiffness (usually of the upper leg). Fatigue in varying degree occurred in most patients. None of these are cause for alarm. Nausea and vomiting, if severe, may be relieved in most cases by simultaneous sublingual or parenteral administration of from 1/150 to 1/120 grain (0.4 to 0.5 mg.) of atropine sulfate. Numbness and tingling are at times due to the use of ergotamine tartrate; at other times they are a component of the migraine syndrome unrelated to the use of ergotamine tartrate. These symptoms constitute a warning only when they become prolonged, persistent or progressive. In such instances, it is wise to discontinue ergot therapy, examine the patient carefully and resume therapy with caution if the examination has revealed no evidence of impending ergotism. Muscle pains and stiffness are frequent symptoms. They may be relieved by intravenous injections of suitable calcium compounds or more conveniently by massage and exercise. Lassitude and fatigue are not a source of much complaint except by those patients with associated

Other symptoms occur in not more than 2 per cent of patients after the use of ergotamine tartrate. These are choking sensations, globus, insomnia, restlessness, substernal oppression, precordial pain, femoral or brachial perivascular pain, and pain in varicose veins. Of these, substernal oppression and vascular pain are most frequent. Following reassurance, the first two symptoms do not usually reappear with subsequent injections. The insomnia may be relieved by sedation when necessary. On the other hand, substernal oppression or precordial pain contra-indicates ergot therapy until coronary disease has been excluded. Treatment may then be cautiously resumed. No untoward results have followed its use in several cases presenting these symptoms. Vascular pain is not a contra-indication to its use unless obliterative vascular disease is present. Ergotamine tartrate has been used without disaster by a few patients complaining of pain in varicose veins. Whether or not it may be continued safely is as yet undetermined.

There are many symptoms which on rare occasions follow the use or ergotamine tartrate. Many of these would appear to be psychogenic, as, for example, generalized numbness, coldness and 'tightness', acute anxiety, and 'swelled head'. These symptoms have appeared in the more neurotic patients and usually do not reappear after reassurance. It is interesting that such symptoms may follow the use of ergotamine tartrate because it has been reported that this drug has been used to advantage in abolishing somewhat similar symptoms in psychotic patients. Urticaria, itching and local or generalized cedema have on rare occasions been observed to follow the administration of ergotamine tartrate. These symptoms raise the question of specific sensitivity, especially in the light of favourable reports concerning its use in the relief of pruritus of renal or hepatic origin. Numbness in one arm may rarely occur. Two patients reported cyanosis and paræsthesias of the face. Another complained of clawhand twelve hours after oral administration of either 5 mg. of ergotamine tartrate or ergonovine. Mental dullness is a rare complaint. Even more rare are complaints of 'stiffness' of the jaw, neck or feet.

It is difficult to ascribe all the symptoms following

It is difficult to ascribe all the symptoms following the use of ergotamine tartrate to specific action of the drug. Many are undoubtedly psychogenic. Another large group may be ascribed to vasospasm. Among the latter are numbness, tingling and coldness of the extremities and vascular pains. Nausea and vomiting are probably the result of a specific action of the drug. Lassitude, fatigue and dullness may be central effects

Œdema and itching are possibly evidence of a sensitivity to the drug.

The significant symptoms are those indicating the development of ergotism (numbness, tingling, coldness, blanching or cyanosis of extremities), those suggesting coronary occlusion (precordial pain and oppression, pain or paræsthesia of the entire arm), and those warning of vascular occlusion (vascular pains, cyanosis, blanching, peripheral pain and paræsthesias). The persistent occurrence of such symptoms temporarily contra-indicates the use of ergotamine tartrate. An examination should be made at once. If no evidence of organic pathologic condition is demonstrable, the treatment may be cautiously resumed.

#### SYMPTOMS AND SIGNS OF ERGOTISM

Because of the infrequent occurrence of ergotism following the use of ergotamine tartrate, its signs and symptoms have not been clearly defined. The occurrence of ergotism following the use of ergotamine tartrate has always been determined by the symptoms that follow over-ingestion of whole ergot. There are in whole ergot other active constituents, such as histamine, which may mask or alter the toxic phenomena due solely to ergotamine tartrate. Nevertheless, although ergotamine tartrate may produce a type of ergotism different from whole ergot poisoning, familiarity with the latter is essential in estimation of the former.

Ingestion of excessive amounts of whole ergot may cause a gangrenous, a convulsive or a combined type of ergotism. The more common symptoms of gangrenous ergotism are general lassitude, mental dullness, vague lumbar pains, cramplike pains in the calves and dull burning pains in the extremities followed by intense waves of heat or cold with numbness finally supervening. The signs consist of moderate vomiting, swollen or inflamed feet (rarely hands), a livid cold skin over the extremities with the appearance of red or violet vesicles and cyanosis later turning black. Jaundice often occurs. The extremities become pulseless and the gangrene is dry and bloodless until infection is superimposed. When infected, the gangrene becomes moist. The legs are especially affected, the hands rarely. Gangrene is equally frequent in males and females but is often less severe in the latter. In pregnant women whole ergot is reported to produce gangrene before it results in abortion.

gangrene before it results in abortion.

Since convulsions do not invariably occur in 'convulsive ergotism', it is suggested that 'neurogenic ergotism' may be a better term. In this type the outstanding symptoms are fatigue, 'heaviness of head and limb', 'giddiness', insomnia, restlessness, excitement, delirium, dementia, mania, impaired sight or hearing, pain and pressure in the chest, gastric pain, formication, 'pins and needles', numbness and 'hot and cold waves'. Paræsthesias usually occur in both hands and feet but may occasionally be unilateral. The signs include painful spasm of the face, throat or diaphragm; contractures of the hands; tonus, clonus and myoclonus; myopia or miosis, cataract; vomiting, diarrhœa and amenorrhœa. Pseudotabetic signs occasionally occur. Hemiplegias or paraplegias may also occur. Histologic examination of the tissues has revealed degeneration of the optic nerve and of the dorsal column and peripheral (lateral column) spinal cord. The cord changes simulate tabes dorsalis or more frequently the type of degeneration found in deficiency diseases. In fact, it has been suggested that 'convulsive ergotism' is determined by a coexisting vitamin-A deficiency. Many of the signs, symptoms and pathologic changes of convulsive ergotism may be due to malnutrition and to hypovitaminosis, since most of these cases have occurred in famine districts.

It has been reported that children are more

It has been reported that children are more susceptible to ergotism than adults. There have, however, been no reports of ergotism in children who have received ergotamine tartrate. No untoward reactions have occurred in children who have received it for migraine attacks.

If one compares the accessory symptoms which most frequently follow the use of ergotamine tartrate with the description of ergotism just given, it becomes apparent that the former are quite similar to the milder symptoms of convulsive ergotism. This suggests that the factor responsible for neurogenic or convulsive ergotism is concentrated in the ergotamine tartrate fraction of whole ergot. On the other hand, other ergot derivatives produce much the same symptomatology. Furthermore, ergotamine tartrate is capable of producing either type of ergotism in animals or man. It would therefore appear that ergotamine tartrate produces a type of ergotism as yet indistinguishable from that caused by whole ergot.

#### PATHOLOGY OF ERGOTISM

Experimental gangrene in animals and accidental gangrene in man caused by ergotamine tartrate are quite similar from the pathologic point of view. The vascular alterations are of primary interest. In general there is an arterial vasospasm primarily affecting the arterioles and smaller arteries, although the larger arteries may at times be constricted to a greater degree. Associated with this vasoconstriction there are various degrees of intimal ædema and hyperplasia, hyaline degeneration, thickening of the arterial walls, lymphocytic infiltration and frequent thromboses. The capillaries have been found to be dilated. Venous vasoconstriction is not as marked as the arterial but is present in varying degrees. Thickening of the venous walls also occurs and thromboses are frequent.

Although Spiro maintained that ergotamine tartrate could not be considered to be a vasoconstrictor and Straub claimed that gangrene due to it was the result of vasomotor paralysis, there is much recent evidence to the contrary. Unpublished observations in E. A. Carmichael's laboratory have shown that ergotamine tartrate acts as a vasoconstrictor on the sympathectomized blood vessels of the finger. Polák has shown that gangrene is hastened by section of the abdominal sympathetic chains. Unpublished results (Carmichael) have suggested that it acts as a mild vasoconstrictor on the normal vessels of human skin. In fact, recent observations have indicated that its therapeutic effect in migraine headache is the result of vasoconstriction of the branches of the external carotid artery. Experimental and pathologic evidence in animals and man has thus confirmed the impression that at least grangrenous ergotism due to ergotamine tartrate is a vasospastic obliterative process.

An uncomplicated gangrene due to ergot is a dry gangrene until sepsis supervenes. Many cases of puerperal gangrene have been reported with and without ergot therapy. It is to be emphasized that these are usually moist and not clearly due to ergotamine tartrate.

Changes in the cord simulating those found in tabes dorsalis and the deficiency diseases have been reported in epidemics of ergotism. The only change in the nervous system so far reported after ergotamine tartrate is vacuolization of the myelin sheaths of the peripheral nerves

It has been reported that an attack of ergotism sensitizes subjects to subsequent ingestion of ergot. There is no evidence that this is true of ergotamine tartrate or that a tolerance toward ergotamine tartrate is developed after its prolonged use.

#### TREATMENT OF ERGOTISM

The various means of treating ergotism indicate that no really efficient method has yet been devised. Obviously, the first and most important part of any treatment is that the patient should avoid ergot in any form. Various vasodilators have been used, such as amyl nitrite, sodium nitrite, glyceryl trinitrate and scopolamine hydrobromide. Atropine sulphate has been recommended. Theophylline compounds have been used, usually with scopolamine hydrobromide. Daily intravenous injections of from 15 to 20 c.c. of a 3 per cent solution of magnesium sulphate have been considered superior to the usual narcotics and bromides.

Barger lists the use of from 5 to 25 c.c. of 25 per cent magnesium sulphate intravenously. Intravenous dextrose may be used because of the hypoglycamia often present in ergotism. Chloroform, cardiac stimulants and emetics have been recommended when indicated. Because of the immunity in female rats to gangrene caused by ergotamine tartrate following the use of cestrin (theelin), intramuscular injections of cestrin (theelin, amniotin, theelol, progynon and the like) might be tried in the milder cases occurring in women. Alternate hot and cold foot baths or alternate suction by means of a 'vasculator' may be used for gangrene. As in many disorders, the best treatment for ergotism is prevention.

#### CONTRA-INDICATIONS

Just why sepsis should predispose to gangrene is not clear. In intravascular infection, such as thrombophlebitis, the relationship is more apparent. Several authors maintain that ergotamine tartrate is no more than a contributory agent to the production of gangrene in such cases. Others believe that it plays no rôle whatever in the production of gangrene in the septic puerperium. Nevertheless, because of the frequent presence of pre-existent sepsis in those cases wherein gangrene has followed the use of ergotamine tartrate, infection must be considered a contra-indication to the use of ergotamine tartrate in the treatment of migraine headache.

In order to prevent vascular occlusion and gangrene, ergotamine tartrate should not be used in the presence of Raynaud's or Buerger's disease, venous thromboses, syphilitic arteritis or marked atheromatous arterial disease, especially in cases presenting any degree of coronary occlusion. In several cases of essential hypertension, ergotamine tartrate has been used without disaster. It has also been safely used in several cases of arteriosclerosis and hypertension. Furthermore, there are reports concerning its use in Raynaud's disease. Experimental and pathologic evidence, however, indicates that, although capillaries may be dilated after overdoses of ergotamine tartrate, arteries and arterioles are constricted and obstructed. Therefore, because of experimental, pathologic and clinical reports concerning certain vasospastic and obliterative tendencies of ergotamine tartrate, it is considered unwise to use it in the presence of obliterative vascular disease, especially coronary occlusion.

Hepatic disease was present in four cases and renal malfunction in another four cases in which accidents followed the use of ergotamine tartrate. It may be that impairment of 'hepatic detoxication' or renal elimination allows some potentially dangerous component of ergotamine tartrate to act in an unrestrained fashion. As jaundice often occurs in whole ergot poisoning, it is possible that ergotamine tartrate may produce further hepatic damage in these cases. On the other hand, at least ninety patients with demonstrable hepatic disease have been treated with ergotamine tartrate with only four accidents. In the treatment of migraine headache, administration of ergotamine tartrate has been avoided in patients with demonstrable hepatic or renal disease. It is recommended that ergotamine tartrate be used cautiously, if at all, in the treatment of migraine headaches complicated by demonstrable hepatic or renal disease.

'It has just been recommended that ergotamine be avoided in the treatment of migraine complicated by vasospastic and hepatic disease. Some authors maintain the migraine itself is a vasospastic disease, others that it is hepatic. How then can one use ergotamine in its treatment? No evidence for gross hepatic malfunction in migraine has been presented. There may be some barely detectable malfunction in a certain group of cases. This does not constitute a contraindication to the use of ergotamine. As to vasospasm, no worthwhile evidence has been presented that vasospasm occurs in migraine to any degree. Certainly it is not the intracranial ætiologic agent.'

Several instances of chemically demonstrable vitamin-C. deficiency have been observed in the present series

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of migraine patients. Accessory symptoms following the use of ergotamine tartrate appeared to be much more severe than in the remaining patients. Possibly the action of ergotamine tartrate on the vascular and nervous systems of these patients is enhanced by the pre-existing pathologic changes due to the deficiency of vitamin C. The question is as yet unsettled.

A few patients may be hypersensitive to ergotamine tartrate. Such subjects give clinical evidence of extremely unstable vasomotor systems. In them marked and sometimes bizarre reactions occur following the use of ergotamine tartrate. Such conditions need hardly be listed as contra-indications, since the patients almost invariably refuse further ergotamine tartrate. It is essential in such cases to be certain that these patients are not denied treatment because of purely psychogenic symptoms. Several cautious and well controlled trials of ergotamine tartrate are indicated.

Despite observations that it is difficult to produce the order with a region of tartrate.

abortion with ergotamine tartrate, pregnancy must be considered a contra-indication to its use in migraine attacks. Fortunately, many women cease to have attacks after the first month of pregnancy.

#### DOSAGE

Overdosage appears to be responsible for most of the ill effects that follow the use of ergotamine tartrate. On the other hand, large doses have been used without ill effect. Lichtman has successfully used 1 mg. three times a day by mouth for twenty-eight days. Podolsky has used the same dose for fifty-six days at a time. Baber and Tietz have used 6 mg. a day for fourteen days and Meakins and Scriver have used up to 18 mg. a day for at least ten days. Brack is reported to have used 1 mg. three times a day for six months. Almost every obstetrician has used as many as two 0.5 mg. injections in one day, and I have on rare occasions used two such injections in one day. Five years' experience with the drug, however, has suggested that smaller doses are sufficiently effective.

In the treatment of migraine attacks, it is recommended that the intravenous route be used only by those thoroughly familiar with the drug. When administered by the intravenous route no more than 0.25 mg. (0.5 c.c.) is to be given at the initial trial. The maximum single intravenous dose is 0.5 mg. (1 c.c.) No more than one such injection should be given in

twenty-four hours, nor more than two such injections in any one week. Continuance should not be at a rate greater than 0.5 mg. (1 c.c.) per week.

By way of the subcutaneous or intramuscular routes, the initial dosage may be increased to 0.5 mg. (1 c.c.), but the remainder of the precautions suggested for intravenous therapy apply as well to these methods of intravenous therapy apply as well to these methods of administration. Rarely two 0.5 mg. injections may be necessary within twenty-four hours. Two injections a week have been used by a few healthy patients without untoward effects.

Sublingually the dosage is much larger. The average patient requires from 3 to 4 mg. (three to four tablets) at the onset of a headache with from 1 to 2 mg. (one to two tablets) per hour thereafter, if necessary, until not more than a total of 10 mg. has been absorbed. Such a procedure may be followed safely once a week and nossibly twice a week sign of the same of th and possibly twice a week, if under the immediate care of a physician.

The average oral dose for ingestion is from 4 to 5 mg. (four to five tablets) taken at once, followed by 2 mg. (two tablets) an hour, if necessary, until a total of 11 mg. has been taken. When more than 8 mg. is necessary for relief by either the sublingual or the oral route, it is best to substitute the subcutaneous injection of 0.5 mg. (1 c.c.).

In the treatment of migraine headaches, it is essential that the drug be given as early in an attack as is possible, preferably during the prodromal stage. When given early, the amount necessary to produce relief is greatly decreased.

These precautions are considered to be entirely safe but practical. It should rarely be necessary to exceed such doses.

Conclusions

The reports of forty-two cases were found in the literature in which ill effects followed the use of ergotamine tartrate. The great majority of these occurred because of overdosage, pre-existing sepsis or obliterative vascular disease. These cases are conobliterative vascular disease. These cases are conservatively estimated at not more than 0.01 per cent of the total number of cases in which ergotamine tartrate was used. No accidents have been reported following its use in the migraine syndrome.

In five years' experience no serious complications

have occurred in the treatment of 189 patients with migraine headache. Accessory symptoms are frequent after the administration of ergotamine tartrate. Usually they are merely annoyances; occasionally constitute warnings of impending disaster.

Contra-indications to the use of ergotamine tartrate are septic states, especially when associated with intra-vascular foci and obliterative vascular disease, especially when coronary.

Treatment should be continued with caution in the presence of marked arteriosclerosis, hepatic or renal disease, vitamin-C deficiency and hypersensitivity to

the drug.

Overdosage has been regrettably frequent in the use of ergotamine tartrate in the treatment of conditions other than migraine. When correctly administered in the absence of contra-indications, ergotamine tartrate may be considered a safe and extremely valuable means of aborting or terminating migraine headaches.

#### Chemotherapy of Pneumococcal Pneumonia

By COLIN M. MACLEOD, M.D.

(Abstracted from the Journal of the American Medical Association, Vol. CXIII, 7th October, 1939, p. 1405)

THE ideal chemotherapeutic agent may be defined as one which, by inhibiting certain vital functions of the invading micro-organism or neutralizing its products, terminates the disease without causing any toxic effect on the host. This definition presupposes that the point of attack must be on a specific function or structure

unique to the micro-organism, so that the tissues and organs of the host escape the toxic action.

Ethylhydrocupreine (optochin) was introduced by Morgenroth and Levy in 1911 for the treatment of pneumococcic infections, after study of numerous other quinine derivatives. A good deal of enthusiasm followed the early experimental results and ethylhydrocupreine was used in the treatment of human pneumonia. However, the observations of Moore and Cherroy, led to the conductor that the conductor of other Chesney led to the conclusion that the use of ethylhydrocupreine in the treatment of pneumonia could not be recommended since it was impossible to administer an amount sufficient to achieve an effective concentration in the blood stream without subjecting the patient to the danger of toxic effects, of which amblyopia was the most frequent. Other quinine derivatives have since been recommended but up to the present time not one has had widespread clinical use.

The report by Domagk in 1935 of the therapeutic action of a sulphonomida commend of the commendation of

action of a sulphonamide compound on infections due to the hæmolytic streptococcus led to the use of related compounds in the treatment of pneumococcic infections. Sulphanilamide was the first of these derivatives to be extensively used but its effect on experimental pneumococcic infections was found to be relatively small.

The most promising sulphanamida desirative sulphanamida desirative

coccic infections was found to be relatively small. The most promising sulphonamide derivative, sulphapyridine, was introduced in England in 1938. The first report by Whitby on the use of this drug in experimental pneumococcic infections of mice showed such striking results that little time was lost in applying the experimental results directly in the treatment of pneumococcic infections of man. It is difficult to say at present how much the early enthusiasms may have to be tempered in the light of further experimental and clinical observations. However, it seems quite certain that the use of sulphapyridine is a distinct advance in the therapy of pneumococcic infections. advance in the therapy of pneumococcic infections.

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#### Mode of action

The mode of action of the sulphonamide group of drugs on different species of bacteria is poorly understood. Sulphanilamide exerts a bacteriostatic effect on susceptible micro-organisms, but its mode of action has not been fully elucidated. It has been postulated that sulphanilamide achieves its bacteriostatic effect by the inhibition of certain enzyme systems of the bacterium, thus interfering with cell nutrition. On the other hand, it has been suggested that the drug combines with some essential growth substance, which then ceases to be available to the microorganism. A somewhat different hypothesis has been advanced by Locke and his associates based on the observation that sulphanilamide when oxidized by ultraviolet rays exerts an anticatalase effect. From point of view the action of sulphanilamide is indirect. depending on the accumulation of hydrogen peroxide when catalase is inhibited. In the case of microorganisms such as the pneumococcus or the hæmolytic streptococcus, which do not possess demonstrable catalase activity, the bacteriostatic effect would then depend on the inhibition of catalase in the tissues and fluids of the host or in the medium in which the organisms are growing, thus permitting hydrogen peroxide to accumulate and exert a bacteriostatic effect. While this may be one of the systems affected by sulphanilamide or sulphapyridine, it would not appear to be the sole one so inhibited, since sulphapyridine will restrain the growth of pneumococci in a medium which does not contain demonstrable catalase.

#### CLINICAL USE OF SULPHAPYRIDINE

The numerous reports concerning the therapeutic effect of sulphapyridine in pneumococcic pneumonia have been uniformly favourable. Mortality rates of from 2 to 10 per cent in series of cases reported from various parts of the world indicate that the drug is effective in reducing the mortality rate. However, insufficient attention has been paid to the toxic effects of this chemotherapeutic agent.

Nausea and vomiting are frequent accompaniments of the administration of sulphapyridine. These reactions are unrelated to the dosage of drug or to the blood level. Since vomiting occurs in individuals to whom the drug has been administered parenterally, the effect would appear to be central, in addition to a possible local action on the stomach. Morbilliform skin rashes have been reported, as well as numbness and tingling of the extremities. Cyanosis due to methæmoglobinæmia occurs, particularly if high blood levels of the drug are attained.

More serious toxic manifestations may appear, however, involving particularly the hæmopoietic system and the urinary tract.

#### EFFECT OF SULPHAPYRIDINE ON HÆMOPOIETIC SYSTEM

The occurrence of acute hæmolytic anæmia in patients receiving sulphanilamide has been the subject of many reports, but as yet there is little information available concerning increased blood destruction in patients receiving sulphapyridine. During the routine administration of sulphapyridine to patients with pneumonia, hæmolytic anæmia occurred in two instances; consequently a study of the effect of this drug on hæmolysis was undertaken. Estimation of the total urinary and fæcal excretion of urobilinogen was used as an index of the rate of hæmolysis, since by this means increases in the rate of blood destruction may be observed which might escape detection if only routine clinical procedures are used.

Of the twenty-six patients with pneumonia for whom estimations of urobilinogen excretion were made, six did not receive sulphapyridine and in none of these was there an increase in the excretion of urobilinogen. Twenty patients received sulphapyridine in total dosage varying between 4.5 and 81 gm., and in eight of these the excretion of urobilinogen in stools and urine was increased from one and one-half to five times the normal amount. Acute hæmolytic anæmia occurred in

three of these patients. However, in the twelve other patients who received sulphapyridine, the urobilinogen excretion was normal or only slightly increased. The total dosage of drug administered to patients in the latter group tended to be less than that given to patients who showed increased urobilinogen excretion.

Increased blood destruction does not appear to be a usual accompaniment of the acute infectious process itself, since in eighteen of the twenty-six patients studied the excretion of urobilinogen was within normal limits. The evidence indicates that hæmolysis was due to sulphapyridine rather than to pneumonia itself and that increased blood destruction occurs more frequently following the administration of this drug than would be suspected unless special methods for its detection are used.

The occurrence of granulocytopenia in patients receiving sulphapyridine has been reported. This toxic effect occurs less frequently than hæmolysis but is additional reason for making repeated blood examinations on patients who receive the drug.

#### EFFECT OF SULPHAPYRIDINE ON THE URINARY TRACT

The solubility of sulphapyridine is less than that of sulphanilamide. This may account in part for the occasionally erratic absorption of the former drug and also for irregularities in its excretion. Antopol and Robinson have described the occurrence of calculus formation in the urinary tract of monkeys fed sulphapyridine. The same complication occurred also in rats and rabbits, although in the case of the last two species much larger dosage was required. Renal calculi have been observed likewise by Gross, Cooper and Lewis in rats that were fed sulphapyridine. The calculi described by both groups of investigators were found to be composed chiefly of the acetyl derivative of sulphapyridine.

Hæmaturia, aside from that occurring during hæmorrhagic Bright's disease, has been observed in only two instances during the course of sulphapyridine therapy in this hospital. One of these patients, a man aged 21, suffered from typical renal colic with hæmaturia shortly after discontinuing the drug. A calculus was not visualized by x-ray examination and the symptoms gradually disappeared. According to Antopol and Robinson the concretions of sulphapyridine and its acetylated derivative which occur in the urinary tract of monkeys are not usually seen in roentgenograms although they may become radiopaque because of overlayering with calcium salts.

Southworth and Cook have reported the occurrence of azotemia in two of three patients who developed hæmaturia during sulphapyridine administration. In addition there was acute abdominal pain, which was believed to be of renal and ureteral origin. On cessation of drug therapy and with the forcing of fluids,

these signs and symptoms cleared rapidly.

Depression of renal function may occur, however, in the absence of hæmaturia. In two patients treated with sulphapyridine we have observed a temporary depression of the urea clearance to critical levels associated with azotemia, although hæmaturia was not present in either instance. With discontinuance of drug administration there was a rapid improvement in kidney function with disappearance of azotemia, and complete recovery apparently ensued. The studies of Farr and Abernethy on renal physiology in lobar pneumonia indicate that depression of kidney function is not a usual accompaniment of this disease. Indeed, in the experience of these authors, patients below the age of 40 showed a marked elevation of the urea clearance during the acute phase of the disease, with persistence of the increased function for about one month. In the older age group the urea clearance showed little change.

The impression that the diminution of the urea clearance which occurred in the two cases noted may have been an expression of sulphapyridine toxicity is strengthened by the fact that acute hæmorrhagic Bright's disease the developed in two other patients

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In the first of these patients the earliest symptoms of acute nephritis occurred during the time sulphapyridine was being administered. Although moderate dosage was used, the blood levels of sulphapyridine were abnormally high, associated with a sharp drop in urine output, which occurred within twenty form bours often abnormany high, associated with a snarp drop in urine output, which occurred within twenty-four hours after beginning treatment with the drug. Five days after the drug was withdrawn the patient's blood still contained 0.8 mg. per hundred cubic centimetres of free sulphapyridine. The occurrence of edema, the elevation of blood pressure and gross abnormalities in the mineral process of the process of the contained of the containe

sulphapyridine. The occurrence of œdema, the elevation of blood pressure and gross abnormalities in the urine were of gradual rather than of acute onset. As far as could be determined, the renal function returned to normal in two months.

The course of events in the second patient likewise differs somewhat from the typical picture of acute nephritis complicating an acute infection in that the onset was gradual rather than sudden. The first urinary signs appeared on the day following the discontinuance of sulphapyridine therapy and for the succeeding fourteen days the symptoms increased in severity until the final explosive onset of acute uræmia associated with heart failure.

with heart failure.

Only one patient received antipneumococcus serum treatment in addition to chemotherapy. The use of serum has not been associated in our experience with

renal complications. Both patients have recovered from the acute phase of nephritis, the first apparently completely, but in the second case only partial recovery has taken place during the four months since the onset of nephritis.

#### COMMENT

It may appear that undue stress has been laid on the toxic effects of sulphapyridine. important that such effects should be generally recognized so that the caution may be observed in the clinical use of this valuable chemotherapeutic agent, not only as applied in the treatment of pneumonia but in other diseases as well.

Sulphapyridine gives promise of reducing the death rate from pneumococcal pneumonia and present indications make it seem probable that an even greater reduction in the mortality rate can be accomplished if the drug is used in conjunction with type-specific antipneumococcus serum.

In the opening paragraph of this paper the ideal chemotherapeutic agent was defined as 'one which, by inhibiting certain vital functions of the invading microorganism or neutralizing its products, terminates the disease without causing any toxic effect on the host'. From this point of view sulphapyridine does not fully attain the ideal, since toxic effects of greater or lesser degree are not infrequent accompaniments of its clinical use. Moreover, this powerful drug may not necessarily inhibit the vital functions of the ordinarily susceptible invading micro-organism, since the virulent pneumo-coccus has the capacity both in vivo and in vitro to adapt itself so that the drug does not affect its rate of specific multiplication, virulence or structure.

## Reviews

DISORDERS OF THE BLOOD: DIAGNOSIS, PATHOL-OGY, TREATMENT AND TECHNIQUE.—By Lionel E. H. Whitby, C.V.O., M.C., M.A., M.D. (Cantab.), F.R.C.P. (Lond.), D.P.H., and C. J. C. Britton, M.D. (New Zealand), D.P.H. Third Edition. 1939. J. and A. Churchill, Limited, London. Pp. xii plus 603, with 12 plates (8 coloured) and 61 text-figures. Price, 21s.

This is the third edition to appear within four years. We must refer our readers to previous reviews for details of the scope of this excellent book (November 1935 and December 1937). It was obviously the popularity of this book, which led to an early exhaustion of the issue, rather than the necessity for rewriting it that decided the publishers and authors to issue this new edition. It has however been extensively revised

The problem in new editions is not what shall be added—because recent work usually dictates that—but what shall be omitted; this presents the real difficulty. Though we have not compared the editions

difficulty. Though we have not compared the editions page for page, we have not noticed any omissions that we regret; on the other hand, we would again draw the attention of the authors to the chapter on 'Infection and Infectious Disease', as being an excellent field for curtailment in the next edition: some of the misleading statements in this chapter, which is an unnecessary one, are a blot on the whole book.

In the preface to this edition the authors mention amongst other additional matter 'views concerning the technique and value of sternal biopsy as judged by our experience'. After the reviewer had gone through the process of looking up 'sternal puncture. See Bone marrow biopsy' and 'Bone marrow, biopsy v. infra' (it is a curious form of parsimony common to publishers that prevents them throwing in a page number in these circumstances), he found a score of references to bone-marrow biopsy including five under the subheading 'value of'. He hoped that at least one of these would' be a general appraisal of the value of sternal puncture, but he was disappointed; this is nowhere given."

In the section on the technique of sternal puncture, there are a number of points with which the reviewer cannot agree. For example, the reason for not taking more than 0.25 c.cm. of fluid is surely not simply to avoid causing pain because the withdrawal of the first few drops causes suction pain and if the fluid is then withdrawn slowly the pain, though still occurring, is less intense; there is however a sound reason for taking only a limited amount of fluid and this is that the true bone-marrow fluid is diluted with blood and the percentage incidence of the cells altered if much fluid is withdrawn. Again the idea of using a hammer seems to the reviewer fantastic, as in a personal experience of several hundreds of sternal punctures he has never had the slightest difficulty in piercing the outer table of the sternum, even with old and blunted Salah needles; nor does he understand how one can feel the definite 'give', as described by the authors, if the needle is driven in with a hammer.

The reviewer apologizes both to the authors and to readers of this journal for occupying so much space with these trivial criticisms of a book which has been his 'bible' for four years and which is in his experience the best book or black in the proof of the best book or black in the proof of the best book or black in the proof of the best book or black in the proof of the best book or black in the proof of the best book or black in the proof of the best book or black in the proof of the proof of the best book or black in the proof of the proof the best book on blood diseases in the English language.

L. E. N.

By Zachary Cope, B.A., M.D., M.S. (Lond.), F.R.C.S. (Eng.). 1939. Oxford Medical Publications. cations. Oxford University Press, London, Humphrey Milford. Pp. xii plus 131. Illustrated. Price, 7s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta London

Surgery of the acute abdomen is such a difficult subject that an historical survey from the days of the pioneers is welcome. Our best thanks are due to Mr. Zachary Cope for his instructive monograph on this subject. subject.

It was not the intention of the author to present a complete history of the development of acute abdominal surgery. There are, however, several omissions in the narrative, which it is impossible to overlook. If Lister was the father of modern surgery, then of all his contemporaries who developed his ideas, the first place rightly belongs to Theodore Billroth who will always be remembered as the pioneer of the surgery of the alimentary tract. In 1872, he made the first resection of the esophagus and in 1881, the first successful resection of the pylorus for cancer. Yet his name is not even mentioned in this book!

Modern surgery would not have been possible without two innovations; in 1886 von Bergmann introduced steam sterilization of dressings and instruments, and in 1890 Halsted introduced rubber gloves. These are important landmarks deserving of mention. Wölfler's name, too, is not mentioned but it was he who introduced gastro-jejunostomy in 1881.

The printing and illustrations are excellent but there are a few errors in the index.

P. N. R.

DIVERTICULA AND DIVERTICULITIS OF THE INTESTINE.—By Harold C. Edwards, M.S. (Lond.), F.R.C.S. (Eng.). 1939. John Wright and Sons, Limited, Bristol. Pp. xii plus 335. With 223 illustrations, many in colour. Price, 25s.

There is little doubt that this book is destined to be regarded as an authoritative contribution on a section of abdominal surgery, which, important though it is, remains to a large extent obscure. An appreciative foreword is contributed by Mr. Gordon Gordon-Taylor 'full of confidence in the certain welcome that awaits its reception from his own profession'. It is certain that the reader will endorse this view.

This book consists of 335 pages and four sections, of which the first deals with congenital diverticular of the consideration of

This book consists of 335 pages and four sections, of which the first deals with congenital diverticula. The next section is devoted to the consideration of diverticula of the duodenum. It is the most lucid and complete description of the subject that we have ever come across. There are eight chapters and 70 pages in this section, the concluding chapters on the clinical features and operative technique will be greatly appreciated.

appreciated.

Section three, dealing with diverticula of the jejunum, consists of seven chapters and 53 pages. The historical survey, collection of material and radiological diagnosis bear witness to the author's industry and scholarship. The important subject of diverticula of the large intestine is fully discussed in the last and biggest section. It is no small praise to say that it will be found equally useful to the anatomist, physiologist, pathologist and the surgeon.

This work is in substance the Jacksonian Prize Essay of the Royal College of Surgeons for the year 1932, revised and brought up to date. It represents the result of the author's personal investigation of clinical cases, pathological specimens from both operation and post-mortem and x-ray examination of the alimentary tract. The printing, get-up and illustrations are excellent, reflecting great credit to the publishers. A complete bibliography and a useful index are appended.

P. N. R.

PHARMACOLOGY, MATERIA MEDICA AND THERA-PEUTICS.—By B. N. Ghosh, M.B.E., F.R.F.P. & S. (Glas.), F.R.S. (Edin.). Fifteenth Edition. 1939. Hilton and Company, 109, College Street, Calcutta. Pp. xv plus 763. Illustrated. Price, Rs. 8-8 or 15s. Obtainable from Messrs. Scientific Publishing Co., 9, Taltala Lane, Calcutta

This is one of the oldest standard textbooks for medical students written by an Indian author and the appearance of the 15th edition bears silent testimony to its usefulness and wide popularity. During the last two decades, of all the subjects in the pre-medical curriculum, the teaching of materia medica has perhaps undergone the most radical changes. Instead of asking the student to master the old-fashioned materia medica with all its uninteresting and perhaps useless details of the origin, source, collection, method of preparation and doses of drugs, emphasis is now rightly laid on

the nature and mode of action of drugs on the biological tissues and human systems. This has necessitated a thorough reorientation of teaching and with it, a demand for textbooks reflecting this new method of approach to the subject-matter. It is no mean credit to the present author that he has succeeded in bringing about a happy blending of all that is acceptable in the older and newer concepts and in presenting a textbook that caters admirably for the demands of the modern student. This would have wellnigh been impossible for anybody without a sound knowledge of, and familiarity with the essential needs of the students.

and familiarity with, the essential needs of the students. The present edition embodies all the new additions mentioned in the Addendum to the B. P. (1936) and a number of other significant therapeutic advances such as sulphanilamide, mandelic acid, nicotinic acid, etc. There is also evidence of thorough textual revision to bring the subject-matter abreast of modern times. The introduction of empirical and constitutional formulæ of many organic and synthetic remedies is an innovation in this edition which should be welcome. In line with the modern concept of teaching scientific pharmacology, the author has included 29 illustrations in apposite places in the text depicting the action of various drugs on the different systems of the body. The grouping and the description of individual drugs under various sub-headings are generally satisfactory. In the section dealing with applied pharmacology and therapeutics, the treatments suggested are mostly conservative and represent accepted opinion. Data judged to be still in the experimental stage are generally avoided.

While the text throughout is written in clear, lucid style and every portion of the book is readable, the student, for whom the treatise is primarily meant, is apt to object that he is being offered too much material, touching on all aspects of pharmacology, materia medica including Indian indigenous drugs, toxicology, therapeutics and pharmacy, which he would find it difficult to digest. Without detracting from the usefulness of a knowledge of pharmaceutical processes in the medical curriculum, it is questionable whether the introduction of so much pharmacy in a textbook of this nature and scope is really desirable. Objection may also be raised to the rather extensive use of small type which the reviewer is inclined to think is likely to be a little tiring to the eyes of the readers. This is understandable when it is confined to the treatment of matters that are at present largely controversial or to descriptions of non-official preparations or data of comparatively minor interest to students, but when this is extended to the introductory remarks to the various chapters and sub-sections dealing sometimes with the fundamental principles of drug action, one is inclined to think that the author's idea of condensation and economy of space has been carried a little too far. A volume containing the same amount of reading matter printed in Great Britain or America for instance, would easily have occupied one and a half times the space covered by this volume.

The first section of the chapter on chemotherapy is a little disappointing. Instead of giving the student a conventional definition of the term and a general description of the evolution and scope of chemotherapy, which is to be legitimately expected, the author has given a very good and illuminating note on the physio-pathology of the reticulo-endothelial system which, though useful to the practitioners, may be a little too high standard for the average students. A few blemishes and printer's errors have also crept in. As instances to the point may be mentioned the spelling of 'venyl ether' and of 'cyclopropaine'. On page 292, in the constitutional formulæ of adrenaline and ephedrine, the carbon atom shown at the point of introduction of the side-chain is redundant. References to the literature cited in the text and in the footnotes have been given haphazard (cf. p. 450) and full details regarding year, page number, etc., of the journals mentioned are lacking.

These blemishes which can be easily rectified in a subsequent edition are only minor and do not detract

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from the usefulness of the book which may justly be placed in the very front ranks of similar textbooks in the English language. B. M.

AN OUTLINE OF MEDICAL PSYCHOLOGY.—By E. Fretson Skinner, M.A., M.D., F.R.C.P. 1939.
H. K. Lewis and Company, Limited, London.
Pp. viii plus 173. Price, 6s.

THE author states that this little book represents an attempt to place before the non-technical reader and attempt to place before the non-technical reader and medical students entering on their professional curriculum some of the facts and hypotheses of modern psychology, as applied to the causation of nervous diseases, and their treatment by its means. No doubt this rather turgid sentence describes more or less exactly the purport of the book. At the same time, the condensation of the subject-matter is so intense as to render its exposition somewhat difficult to follow. as to render its exposition somewhat difficult to follow. Nevertheless, for a lay reader at any rate, the book contains a good deal which will repay perusal. The author is an exponent of psycho-analytical therapy and has not much to say about any other psycho-therapy. As regards the attitude of the law towards homosexuality in adults, the author is correct in stating that the law only seeks to punish homosexuality among men and not among women, but he omits to observe that this is British law. In some countries, e.g., Italy, the law does not take cognizance of homosexuality and in others, e.g., Sweden, both men and women are liable to punishment for practising homosexuality. The book to punishment for practising homosexuality. concludes with a presentation of a few clinical histories. For some unexplained reason, the author regards sexual fetichism as a form of obsessional neurosis. This appears to connote a lack of understanding on the part of the author of the ætiology of the two conditions.

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THE SANITARY INSPECTOR'S HANDBOOK. A MANUAL FOR SANITARY INSPECTORS AND OTHER PUBLIC HEALTH OFFICERS.—By H. H. Clay, F.R.San.I., F.I.S.E. Fourth Edition. 1939. H. K. Lewis and Company, Limited, London. Pp. xxii plus 528, with 97 illustrations. Price, 17s. 6d.

BOTH the book and its author are too well known to need introduction. The book has been recognized as a standard textbook on sanitary inspection, particularly for students preparing for London examinations. It should be a standard reference work for practising sanitary inspectors and public health administrators. The fact that the book has reached its fourth edition in so short a time is evidence of its growing popularity and usefulness.

The present volume, which retains the commendable qualities of the previous editions, contains much new matter and some new illustrations, the principal change being the chapters on food and food premises which have been re-written.

The book is written for English conditions that are largely urbanized and consequently has very obvious limitations for India. The latter are particularly in the fields of rural sanitation in general and malaria in particular.

The usefulness of the book is greatly enhanced by the excellent index and by its glossary of terms and appendix of comparative tables and definitions.

# Abstracts from Reports

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1937. BY LIEUT.-COLONEL A. M. V. HESTERLOW, M.B., Ch.B. (EDIN.), B.Sc., P.H. (EDIN.), D.T.M.&H. (EDIN.), I.M.S., DIRECTOR OF PUBLIC HEALTH

Kala-azar.—The number of deaths from kala-azar during the year 1937 was larger by 304 than that of 1936. The number of patients treated was also larger by 1,464. The increase both of deaths and cases treated is shared by Sylhet, Goalpara, Nowgong and Sibsagar districts. The method of diagnosis and treatment of kala-azar continued to be the same as in previous years. Special attention continues to be given to intensive Special attention continues to be given to intensive and detailed surveys in all districts in order to detect fresh cases and bring them under treatment as early as possible. A sub-assistant surgeon was deputed to Cachar district specially for kala-azar survey duty. The sub-assistant surgeons in charge of hearitals and sub-assistant surgeons in charge of hospitals and dispensaries also surveyed 514 villages during 1937.

Cholera.—The number of deaths from cholera during

the last 10 years was as follows:-

1927				15,392	
1928		 		6,915	
1929 1930	THE THE	****		7,765	
1931	••	••		6,332	
1932				5,523 4,971	
1933				5,508	
1934				1,904	
1935				7,436	
1936 1937	••			3,816	
1991		 	-	5,440	

The increase of cholera mortality in 1937 was due to an increase of the disease in the district of Sylhet. In this district 4,371 persons died from cholera against

2,047 in the preceding year. At first the outbreak was of a sporadic nature but later it assumed an epidemic form owing to the scarcity of drinking water. Delay in reporting the outbreaks also helped in permitting the outbreak to become widespread. In other districts only sporadic cases occurred.

#### RURAL SANITATION

About 97 per cent of the population of Assam live in rural areas, consequently the health and prosperity of the people of these areas is a matter of vital importance. Local boards should pay special attention to the provision of adequate and referentees simplies. to the provision of adequate and safe water supplies for villages. Until this is done no material reduction in the incidence of water-borne disease can be expected. The public health measures which are extensively carried out in rural areas are protection against cholera by inoculation, the use of bacteriophage in the treat-ment of cholera cases and protection against smallpox by vaccination. Kala-azar treatment measures continue to be carried out on the lines similar to those amployed to be carried out on the lines similar to those employed hitherto. Tablets of quinine-reinforced cinchona febrifuge for the treatment of malaria are sold in all village post offices and through other accredited agents. Quinine and cinchona febrifuge are considered free Quinine and cinchona febrifuge are also supplied free to indigent persons in all districts. Treatment of yaws, leprosy, malaria, influenza, minor eye complaints, dysentery and diarrhœa is also undertaken by public health department dispensaries in the rural areas. Adulteration of foodstuffs is reported to be increasing in the Province. This may be controlled by more strict supervision, by regular inspection, and a province of supervision, by regular inspection and submission of samples to the public analyst for analysis, and inflicting of adequate punishment in all cases where food unfit for consumption is sold, and where adulteration of articles of food is reported by the analyst. It is hoped that local boards will take more active and deterrent action to prevent adulteration than appears to be the case at present. to be the case at present.

Malaria.—Malaria fever is the most widespread disease in the Province. It is prevalent throughout the Province and almost constantly in epidemic form. A total of 819,845 cases of malaria were treated in all total of 819,845 cases of maintal were treated in an hospitals and dispensaries in the plains districts; 716,192 cases were treated in dispensaries under the medical department and 103,653 cases in the public health department dispensaries. Separate figures of mortality from malaria are not available. As noted in paragraph 25, deaths from 'Fevers' amounted to 100,275 against 97,240 in the preceding year. 109,375 against 97,240 in the preceding year. A very large percentage of these deaths must be attributable to malaria fever. Quinine-reinforced cinchona febrifuge was used as a general preventive and curative agent against the disease and was sold to the public at two annas per tube containing ten tablets of four grains each. As in previous years the Government of Assam gave a grant of Rs. 20,000 to Assam Medical Research Society. The Society's activities are at present confined Society. The Society's activities mainly to researches on malaria.

Maternity and child welfare.—During the year under report the Juarmal Tusnial Maternity and Child Welfare Centre with hostel for accommodation of 12 women for the dai training class was opened at Sylhet. Maternity wards were opened at Sunamganj and Maulvibazar during the year. A maternity ward with 14 beds, operation room and sanitary annexe,

A total of 39,727 infants died during 1937 giving an infant mortality rate of 160.04. This large number of deaths amounting to nearly 109 infants per day can be reduced if more maternity and child welfare centres are opened throughout the Province and a larger number of properly trained midwives is made available. The maternity and infant mortality rates recorded in rural areas were 15.13 and 161.13 and those in urban areas were 19.34 and 120.95 respectively. The maternal mortality for the whole province is 15.24. The number of deaths from child birth is collected through Chaukidars and Gaonburas. Beyond the usual verifica-Charlier and Cashibutas. Beyond the data vehicle tion of vital statistics no special enquiries have been made to verify and check these statistics. The death rate of children under 5 years was 71.95. The high infant mortality rate is due to lack of knowledge regarding maternity and child welfare. The child welfare the constitution is in the heads of welfare and maternity and child welfare. The thind welfare and maternity organization is in the hands of the Red Cross Society. No portion of the public health department's budget was allocated to maternity and child welfare. There was no specialized work for women and children in industrial areas. The number of heds during the year was 47 of beds during the year was 47.

#### ANNUAL REPORT OF THE HENRY LESTER INSTITUTE OF MEDICAL RESEARCH, SHANGHAI, FOR 1937-1938

This report differs from its predecessors in that it covers a period of two years, 1937 and 1938. During the first six months of 1937 work proceeded normally except for the welcome interruption of the medical conferences held during April. These attracted a record attendance and marked the opening of the new Hospital and Buildings of the National Medical College of Shanghai. From August 1937 to September 1938 the Institute, in company with other organizations in Shanghai, had to adjust itself to new conditions and during this period the main building was closed, except for the variable. for the period from August to January when it was used by the General Hospital. Most of the foreign staff were sent to England on leave and those about to return were told to remain in England. It was decided, however, that every effort should be made to maintain the integrity in the Institute as a working organization by means of a skeleton staff and this was made possible through the suspension of clinical research and the use of the Clinical Unit, laboratories for general purposes. Gratitude must also be expressed for academic hospitality, to the Shanghai Municipal Council, the University of Hongkong, the King Edward VII Medical College, Singapore, and the London School of Hygiene and Tropical Medicine.

[In spite of the restrictions indicated in the above paragraph a large amount of research work appears to have been carried out. It is of too detailed a nature to lend itself to abstraction but the report contains much interesting matter particularly on nutritional problems and nutritional diseases in China.—Editor, I. M. G.]

#### ANNUAL REPORT OF THE MYSORE STATE DEPARTMENT OF PUBLIC HEALTH FOR 1937

State of public health.—Except for an increase in the incidence of plague and cholera and a decided decrease in the incidence of smallpox, the general state of public health, as indicated by the mortality and morbidity rates, was normal.

Cholera assumed epidemic proportions in Mysore, Shimoga and Chitaldrug districts, the number of deaths reported from the disease being 4,239 as against 1,793 in 1936. Three lacs, eighty-two thousand, two hundred and thirty pine and inhelper incompletion. and thirty-nine anti-cholera inoculations were done during the year, of which 159,644 were done in the Mysore district alone. In the city of Mysore, there were 341 attacks and 177 deaths and the number of inoculations performed was 67,349, while in the city of Bangalore, the number of attacks, deaths and inoculations was 55, 29 and 4,596 respectively.

A preliminary study of statistics of cholera in the state from the year 1887 was made and the following

were the conclusions reached:-

(i) The state is not highly infected with cholera, but some districts are open to periodic out-breaks especially in, what may be called,

epidemic years;
(ii) there are two gateways by which infection is brought into the state, viz,
(a) along the Yelandur-T.-Narsipur border and

(b) along the Harihar-Davangere border;
(iii) although the state as a whole is not highly infected, a few taluks at least, and some smaller foci show continued infection.

Plague was reported chiefly from Bangalore, Kolar and Hassan districts, the number of deaths from the disease being 4,842 (1,793). The number of anti-plague

inoculations done was 221,080.

Deaths from smallpox were 1,095 (4,973). The number of vaccinations performed was 247,784.

Deaths from typhoid were slightly more this year,

both in the Mysore and Bangalore cities, the number being 63 (51) in the Mysore city and 88 (61) in the Bangalore city. A number of anti-typhoid inoculations were no doubt performed, but there is need for further systematic investigation into the causes of this disease and for taking effective measures to prevent

Vital statistics.—In pursuance of the recommendations of the Committee on Vital Statistics, the revised system of registration and compilation of the statistics of births, deaths and marriages was introduced into the Bangalore and Mysore cities and the Kolar Gold Fields and into the districts of Bangalore and Shimoga.

The total number of births during the year was 146,737 (136,569). The computed birth rate was 21.6 as compared with 20.3 in the previous year. The highest birth rate was reported by the Chitaldrug district (24.5) and the lowest by the Kadur district (15.4)

The total number of deaths during the year was 102,118 (96,278). The computed death rate was 15.1 102,118 (96,278). The computed death rate was 15.1 per mille of population. Births exceeded deaths in all districts except Shimoga. The total number of deaths among children under one year of age was 15,567 (15,895), giving an infant mortality rate of 106.1 per 1,000 live births against 116.6 in the previous year. The total number of deaths due to child birth was 2,191 (2,128), the mortality rate being 14.7 (15.3) per 1,000 births 1,000 births.

Public health institute.—A new section was started in the institute during the year for the manufacture of plague vaccine, in addition to the preparation of

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T.A.B. and anti-cholera vaccines. Experimental work was also continued in connection with the standards of purity of articles of food as well as the nutritional value of rice, ragi, etc.

Bureau of health education.—Two health exhibitions were held at Mysore, one in connection with the Dasara exhibition and the other in connection with the annual Swadeshi exhibition. A health museum has also been established in Mysore city as a permanent feature in the new exhibition buildings.

Bureau of rural health.—The health training centre at Closepet continued to do good work. Health leagues were started in 16 villages in the area, with the following programme:-

(1) Providing latrines of standard type to individual

houses

(2) introduction of windows;

(3) white-washing;(4) improvement of flooring;

(5) removal of manure pits from the village site;
(6) improvement of water-supply, and

(7) improving the cleanliness of the village generally.

In the rural health unit, Mandya, no marked change was visible in the incidence of malaria. The control of malaria in Mandya town was continued under the supervision of the unit staff.

Bureau of epidemiology.—The work of the bureau consists of organizing measures for the control of epidemic diseases including malaria and conducting the campaign against hookworm and guinea-worm.

The annual spleen and parasite survey of Bangalore city was done as usual. The spleen rate for the whole city was found to be 0.31 (0.30) and the parasite rate 0.5 (0.8). In Mysore city, a combined programme for the control of general mosquito nuisance in certain sections of the city and selective anopheline control as a purely anti-malarial measure in the other sections was carried out during the year. Malariol was used for controlling mosquito nuisance and Paris green for anopheline control. The spleen and parasite rates in the three malaria stations during the year were as noted below:-

ar r	Spleen	rate	Parasite rate	
Station	1937	1936	1937	1936
Nagenhalli Hiriyur Mudgere	22.1 45.6 28.2	24.1 26.4 23.1	5.8 12.0 2.8	6.5 7.9 2.2

A new type of latrine for rural areas, which is very promising as a means of eliminating fly breeding, was evolved and was under trial in Chikballapur. The hookworm staff visited 26 villages in the Periyapatna sub-taluk and treated 2,367 persons. They also visited 136 villages in the Krishnarajpete taluk and treated 2,509 persons cut of a tatal population of 47,022 9,592 persons out of a total population of 47,032. Three hundred and fifty-eight public latrines of the 'hagevu' type were constructed in 50 villages.

The guinea-worm staff visited 832 villages, examined 440 wells, chlorinated 55 wells, restocked 97 wells with fish and newly stocked fish in 70 wells and established 32 nurseries. Since 1928, 122 well works have been undertaken as a means of controlling guinea-worm disease at a cost of Rs. 1,16,434.

Important measures.—Among the important events of the year may be mentioned—(1) the transfer of the regulation of maternity and child welfare work from the health to the medical department; (2) placing the services of a medical officer at the disposal of the Red Cross Society for appointment as secretary; (3) training 21 students in the sanitary inspectors' training class; and (4) the appointment of two public health probationers health probationers.

BLINDNESS IN INDIA. PUBLISHED BY THE NATIONAL INSTITUTE FOR THE BLIND 224-6-8, GREAT PORTLAND STREET, LONDON.

THE census of 1931 gave the number of blind persons in India and Burma as 601,370, or 172 per hundred thousand of the population. Census returns generally tend to under-statement of physical defect, and this tendency to under-statement is probably specially strong in India, where purdah influences would be opposed to in India, where purdah influences would be opposed to the notification of blindness in girls of marriageable age. Sir John Megaw states that from random samples of villages investigated in a survey made by him a few years ago, it would appear that there are about two million blind people in India.

The late Mr. C. G. Henderson, founder of the All-India Blind Relief Association, in an address delivered at the World Conference on Work for the Blind, held in New York in 1931, spoke as follows:—

'It is estimated that there are one and a half million totally blind persons, and in addition, some four and a half million persons partially blind. . . In 1918, in

a half million persons partially blind. . . . In 1918, in the district in which I was serving, I had a list of blind and partially blind persons made out in an area containing about 250,000 population, and then inspected the totally blind. I found at least four and half per thousand. The same thing was done in several districts, with the results that we found that three, four, seven, and even nine per thousand of the population were totally blind, as against the census average of one and a half.

The estimate given by Mr. Henderson in this extract is rather more pessimistic than that given by the Indian Red Cross Society. 'There are in India, about one million blind persons, and for each blind person there are three others with seriously impaired

sight'.

#### Prevention of blindness in India

The problem of prevention of blindness is a most pressing one. Although no exact figures are available as to causation, it is indisputable that a great part of India's blindness is due to infantile ophthalmia, to neglect of simple eye diseases in children, to the application of irritant remedies, to smallpox and to trachoma, all of which are preventable, or can be remedied by proper treatment.

Although with the death of Mr. C. G. Henderson in 1931 the activities of the Association which he had

1931 the activities of the Association which he had founded came to an end, the work which he did for prevention of blindness in India indicates the line of attack which will probably be followed in the future, and which characterizes the work of such organizations as the Bengal Association for the Prevention of Blindness. The problem of blindness, like so many others in India, is one peculiarly affecting the rural population. 'The towns of India only account for a small part of its three hundred and fifty million inhabitants meet of whom can cally be reached if inhabitants, most of whom can only be reached if help is brought directly to them.' The special merit of Mr. Henderson's gallant enterprise was its recognition of this principle. tion of this principle. The fourfold basis of his campaign was outlined by him as follows:—

1. Prevention, by means of personal effort in the visitation of the villages, with special reference to treatment of ophthalmia neonatorum and the vaccination

of all smallpox contacts.

2. Propaganda, by means of pamphlets printed in the vernaculars, lectures by touring medical officers, films showing dangers of infection, and co-operation with village officials in matters relating to eye diseases and sanitation.

3. Sight-saving in schools, with inspection of the children and treatment where necessary, together with talks to the children on matters assessed to the children on matters. talks to the children on matters concerning the care of

the eyes.

4. Establishment of touring hospitals. The touring eye surgeon to camp at certain central villages, where sufferers from eye diseases from the surrounding country can come to him for treatment or operation.

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THE MANAGEMENT AND MEDICAL TREATMENT OF CHILDREN IN INDIA AND THE TROPICS

The two previous editions of Birch's well-known household classic were revised and brought up to date by Dr. V. B. Green-Armytage (Lieut.-Col., I.M.S., Retired). The 8th Edition has been further improved by Dr. E. H. Vere Hodge (Lieut.-Col., I.M.S.) who collaborated with Colonel Green-Armytage in the 7th Edition.

Over 20,000 copies of Dr. Birch's book have been sold since it was first published.

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These recommendations were in many respects similar to those passed at a Conference of the All-India Ophthalmological Society in 1935.

#### Education in India.

The inquiries made in 1930 showed that although there were rather more than twenty schools for the blind in India, the majority of these were small, probably not accommodating more than about a dozen pupils. Only the most elementary curriculum of reading, writing and arithmetic was attempted, together with a little handwork, and few children remained at school long enough to derive real benefit. The fact that there was no system by which the child could pass from school to training-centre, and from training-centre to workshop, made a dead-end of education in many of the schools, and parents were disinclined to allow their children to attend. Begging is the recognized and time-honoured form of livelihood for the blind in India, and it must be admitted that there is little encouragement for those who desire something better.

#### Industrial training

There is very limited provision made in India for the industrial training of the blind, partly because few pupils remain long enough at an institution to avail themselves of it, and also because the training-centre is only one stage of any properly conceived plan for the blind, and workshops where trades can be carried on by the trained worker are a necessary corollary.

#### Memorial of the Secretary of State

A conference was held, of persons with knowledge of India or special experience of work for the blind in this country, and it was decided by them that the problem was altogether too vast for private enterprise to attempt a solution. In March 1931, a Memorial was addressed to the Secretary of State for India, concentrating especially upon the known facts of preventable blindness in India, and expressing the hope that some action might be taken by the Government. The signatories to the Memorial included a former Viceroy, two former Governors of Indian provinces, two former Indian bishops, a former Educational Commissioner with the Government of India, and several medical men with experience of ophthalmological work in India.

The Memorial was referred by the Secretary of State of Local Governments and Administrations for their consideration, and at a later date a further letter from the National Institute to the Secretary of State was also referred to these bodies. In this letter the hope was expressed that an advisory committee might be set up in India, consisting of persons actively engaged in work for the blind, which would bring together the knowledge and experience of existing organizations for the welfare of the blind and the prevention of blindness.

It was with great regret that the National Institute learned from the Secretary of State for India in June 1933 that almost all Local Governments had expressed their inability, owing to financial stringency, to incur expenditure on the development of measures for the prevention of blindness or for the provision of relief for the blind, and that the majority of them were not in favour of the proposal for the formation of an advisory committee.

#### Co-operation with the Indian Red Cross Society

The hope of Government action having been thus for the time disappointed, the committee met once more, and decided in November 1932 that its best hope of effective action lay in co-operation with the Indian Red Cross.

In April 1934, the National Institute for the Blind made a grant of £570 to the Indian Red Cross Society, of which £450 was allocated for the systematic instruction of teachers in blindness prevention, and £120 for the provision of simple pamphlets on prevention in Bengali, Tamil and Telugu. At a later date, through

the kindness of a private donor, a further sum of £30 was granted to finance Hindi and Urdu editions of the

In February 1936, the Junior Red Cross issued a most interesting report on the expenditure of the grant. Four of the leading ophthalmologists in India had been consulted regarding the organization of the lectures for teachers, and a syllabus had been drawn up for a course of two lectures, followed by practical demonstrations. Each lecturer was supplied with a set of coloured slides, and with a list of all material—pamphlets, posters, slides and films—on prevention of blindness, obtainable from the Red Cross Society.

A circular letter was then sent out to all Provincial

A circular letter was then sent out to all Provincial and State Red Cross branches, inviting them to carry out the scheme through the agency of the Junior Red Cross, which has 10,000 school groups, and a membership of 350,000 school children. Reports were received in due course from eighteen of these.

The National Health Association of Southern India has also been active in arranging lectures for school teachers, held at the Teachers' College, Saidapet, and elsewhere, with a view to educating the teachers in the principles of blindness prevention.

In May 1936, the National Institute for the Blind made a further grant of £170 to the Indian Red Cross, for the provision of pamphlets in Canarese, Marathi and Sindhi. As a result, 30,000 pamphlets were published during the year in these languages, and also in Bengali and Hindi, and distributed through the Directors of Public Health and Public Instruction, as well as through the Indian Red Cross Society.

In December 1937 a letter was received from the Red Cross Society, giving a report on the work of the Junior Branch in connection with prevention during the year. Since that date, a further report has been received, and a further grant made by the National Institute, for the organization of more lectures, free lantern slides and posters, and the provision of more vernacular literature.

For the large number of persons who are illiterate, and for whom pamphlets are therefore unavailing, reliance is placed on films and broadcasting.

The Association for Prevention of Blindness, Bengal, has set a valuable example of the way in which blindness may be combated, 'by bringing the benefits of modern ophthalmology to the very doors of the people in the remote villages'

in the remote villages'.

A gift of Rs. 35,000 was made to the Bengal Association by the committee responsible for the administration of the fund raised to commemorate the Silver Jubilee of Their Majesties King George V and Queen.

The first stage of future action must be to stop the flow of recruits to the army of the Indian blind. Valuable preventive work has been done by the All-India Blind Relief Association, the All-India Ophthalmological Society, the Bengal Association for the Prevention of Blindness and the Indian Red Cross Society, all of which organizations are at one in emphasizing the importance of propaganda by lectures, pamphlets, broadcasts, posters and films, and of the value of bringing preventive measures into the homes of the people by means of travelling hospitals, camps and dispensaries. In a small way, and crippled by small resources, these organizations have indicated what might be done on a far wider scale with adequate financial backing.

financial backing.

[This pamphlet is a valuable contribution to one of India's principal public health problems and it should be circulated as widely as possible throughout the country.—Editor, I. M. G.]

#### ANNUAL REPORT OF THE MALARIA ADVISORY BOARD, FEDERATED MALAY STATES, FOR THE YEAR 1938

This is always an interesting and valuable publication, but as it contains only condensed summaries of the various anti-malarial activities carried out under the direction of the Board it does not lend itself to further abstraction. Practically all methods of

mosquito control and malarial treatment and prophylaxis are practised in one or other locality in the Federated Malay States so it is a complete and concise résumé of modern anti-malarial measures in general. All medical officers whose duties are concerned with this subject, especially those working anywhere in India or east of it, should obtain a copy of this report, because they cannot fail to find something in it that will have a bearing on their special local problems whatever they may be.

ADMINISTRATION REPORT OF THE BALU-CHISTAN AGENCY FOR THE YEAR 1ST APRIL, 1937 TO THE 31ST MARCH, 1938

The principal diseases for which treatment was sought during the year and their geographical distribution are shown below:—

in the laboratory. None was found infected. The flea index remained low, being only 1.07 per live rat against 1.81 in the previous year.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH: ANNUAL REPORT BY THE CURATOR OF THE LABORATORY FOR THE YEAR 1938

STATISTICS OF ANTI-RABIES TREATMENT

The eighth analytical review of the results of antirabies treatment at the Pasteur Institutes of the world which submit statistics to the League of Nations, prepared by the superintendent, has now been published. It is noteworthy that the main conclusion therein arrived at—that as an immunizing agent killed carbolized vaccine when given in suitable dosage is as

Name of disease	Quetta- Pishin District	Sibi District	Loralai District	Zhob District	Kalat and Chagai Districts	Total
Malaria— Treated Deaths	25,137	27,812 1	17,226 1	15,028	28,001	113,204
Dysentery— Treated Deaths	1,130 2	320	160 1	76 1	806	2,492 4
Diarrhœa— Treated Deaths	2,621	2,108	876	948	2,687	9,240
Ulcerative inflammation— Treated Deaths	16,330 1	16,036	15,476	9,464	16,175	73,481 <sub>1</sub>
Rheumatic fever— Treated Deaths	145	230		61	107	557
Diseases of respiratory system other than pneumonia and tuberculosis— Treated	10,184	11,071	7,210 1	5,741	17,057	51,263 5
Other diseases of the digestive system excluding diarrhœa, dysentery and tumours— Treated Deaths	24,441	22,584	15,447	11,913	28,334 1	102,719

ANNUAL REPORT OF THE HEALTH DEPART-MENT, MUNICIPALITY OF SINGAPORE, FOR THE YEAR 1938

Apart from two cases of smallpox we enjoyed another year of complete freedom from the three dangerous infectious diseases, smallpox, cholera and plague. Even with one of the smallpox cases there was an element of doubt in the diagnosis. It came from a house in which there were at the same time several cases of chickenpox. The other was a frank case of smallpox. At first he gave a history of having just arrived from India but later denied this. As no connection with any previous case could be found and no further cases developed in the contacts, the likelihood is that the first story was the correct one and that he was discovered within a very short time of his arrival in the colony.

In connection with plague the usual rat-trapping laid down by the International Sanitary Convention was carried on throughout the year. Four thousand and five rate trapped in the town and port area were examined

efficacious as living vaccine, whilst at the same time it reduces the risk of accident to a minimum—has now been accepted by the French School. In fact, Remlinger, the leader of that school, now strongly advocates the general adoption of this method of treatment. This view was put forward by the superintendent at the Rabies Conference in Paris in 1927, and it is satisfactory that in the light of further statistical data it has now been accepted.

A ninth review is now been accepted.

A ninth review is now in preparation. It will deal with statistics relating to the years 1936 and 1937. As a measure of retrenchment it has been decided by the League of Nations that future reviews will deal with the statistics of two successive years, and will be published every alternate year. The data to be dealt with relate to approximately 200,000 treated persons.

Parasitology.—Trichomonas vaginalis has been found to be present in the vagina of approximately one-half of 200 consecutive female nations who waves examined

Parasitology.—Trichomonas vaginalis has been found to be present in the vagina of approximately one-half of 200 consecutive female patients who were examined and who were attending a venereal diseases clinic in Edinburgh. The presence of the parasite was detected in 45 per cent of 100 pregnant women suffering from

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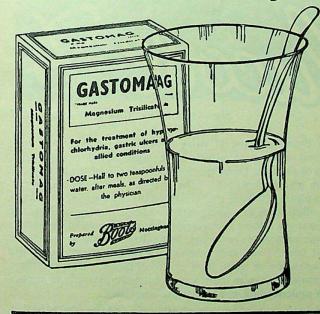
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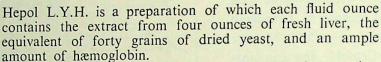
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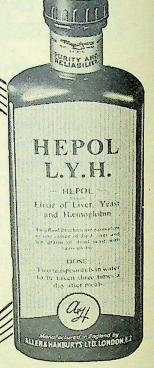


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a discharge and attending the ante-natal clinic of the Maternity Hospital in Edinburgh. There is no doubt therefore that *T. vaginalis* infection is common in this class of patient in Edinburgh. There is little doubt that the presence of the parasite in the vagina is a definite cause of leucorrhoa. The disease is frequently mistaken for gonorrhoa and thus gives rise to awkward social problems. The confusion between the two infections of entirely different ætiology is the more likely tions of energy unferth actions, to occur because it has been found that in as many as 50 per cent of women suffering from gonorrhoa, the presence of *T. vaginalis* complicates the disease. The importance of this fact is evident since it is known that the administration of the drug M. & B. 693 rapidly causes the disappearance of gonococci from the vagina, although the drug has little, if any, effect upon T. vaginalis. Cases of gonorrhosa complicated with a trichomonas infection are not cured by the administration of M. & B. 693; the leucorrhœa continues in spite of the administration of the drug.

The type of leucorrhea caused by T. vaginalis presents certain characteristic signs and particularly during the acute phase of the disease. latent form of the infection has been observed which can assume an acute phase when from any cause the hydrogen-ion concentration of the secretion of the adult vagina becomes altered. The mechanism which maintains the hydrogen-ion concentration of the vaginal secretion of the adult female at a pH of between 4 or 5, and thus eliminates infection by T. vaginalis, is now being studied. T. vaginalis does not multiply in such

an acid secretion.

A number of males infected with T. vaginalis have been found, and the prevalence of this infection among men attending one of the venereal diseases clinics in Edinburgh is under investigation. The possibility that men can be infected with *T. vaginalis* has shed some light on so-called cases of 'non-specific urethritis'.

ANNUAL REPORT OF THE NATIONAL ASSO-CIATION FOR SUPPLYING MEDICAL AID BY WOMEN TO THE WOMEN OF INDIA (COUNTESS OF DUFFERIN'S FUND INCLUD-ING THE WOMEN'S MEDICAL SERVICE) FOR THE YEAR 1938

The first All-India Conference of Medical Women was held in Delhi under the Patronage of Her Excellency the Marchioness of Linlithgow from 13th to 15th December, 1938. The Conference was opened by Sin Francisco. by Sir Ernest Burdon, K.C.I.E., C.S.I., I.C.S., and the deliberations were presided over by Dr. Dadabhov, President of the Association of Medical Women in India. Eighty-three delegates attended the conference from all parts of India. The discussions on 'Eclampsia' and 'Antemias in Pregnancy' brought out more strongly than ever the important part these diseases play in causing the high maternal mortality which prevails throughout India. The great need there is in this country for up-to-date midwifery services, more and better equipmed hospitals for women and more and better equipped hospitals for women and travelling dispensaries was stressed by every speaker. It is the right of every woman to be able to claim adequate attention before, during and after child birth.

A recent tour undertaken by the Screetary in the North-West Frontier Previous at the request of the

North-West Frontier Province at the request of the Inspector-General of Civil Hospitals and with the concurrence of the Provincial Government, it showed the women of the N.-W. F. Province are becoming hospitalminded and are seeking admission to hospitals for women in ever increasing numbers. Especially is this so in the case of maternity patients whose numbers more than doubled during the last few years. The hospital accommodation is now totally inadequate to meet the demand and the existing hospitals for women are all overcrowded and understaffed. state of affairs exists practically throughout India. It seems 'purdah' is rapidly breaking down, but there are still a large number of women who would die rather than enter a general hospital and a still larger number who would prefer to be attended by a member of their own sex for their confinements and for special diseases

There is thus a very strong case for enlarging hospitals for women and for building new ones. Equipment should be modernized and the medical and nursing staffs should be brought more nearly up to the standards existing in Europe and America. The local authorities seem to be unable to give proper financial support to the hospitals under their administration and under the company of the recommendation. evidence is accumulating supporting the recommenda-tions made by various experts that the control of the majority of these hospitals should be handed over to the respective provincial governments. This procedure, if carried out, should lead to an all-round improvement, as, presumably, the financial support given by the local governments would be more in keeping with the requirements of the institutions.

The urgent need for increased medical aid in the rural areas is being more and more stressed on every hand and it is satisfactory to note a scheme for an ambulance service has been inaugurated in the United Provinces.

The recurring income of the Countess of Dufferin's Fund amounting to approximately Rs. 40,000 has been spent during 1938, in grants to Provincial Dufferin Branches and to various hospitals. A sum of Rs. 9,080 was spent on 24 scholarships to students in medical colleges, 14 are awarded from Association funds and the remainder from trust funds administered by the Dufferin Council.

The imperative need for more money for the upkeep of the Dufferin Hospitals was stressed in the report for 1937; inspection of these hospitals in 1938 only reveals more clearly how pressing this need is and the Secretary in her inspection reports has reiterated the urgent necessity there is for repairs and additions to the hospitals. The supply of equipment and nursing staff is still most inadequate.

A comparative study of the annual statistics of the 25 hospitals in charge of W. M. S. officers shows the remarkable increase there has been in the number of admissions to these hospitals during the period 1929

to 1937.

TABLE

Year	Number of in-patients	Number of obstetric cases	Number of operations performed	
1929	0,509	7,263	17,686	
1933	 43,020	10,358	19,758	
1935	51,853	13,606	22,630	
1937	 52,902	16,219	24,591	

The number of out-patients treated has also increased during the same period from 794,565 in 1929 to 980,874

The statistics given above are sufficient evidence to prove that our Dufferin Hospitals are not suffering from 'unpopularity', in spite of insufficient accommodation, staff and equipment.

Unfortunately the accommodation in 1939 is only slightly greater than that available in 1929, so that the problem of overcrowding in all the hospitals is a

very serious one.

The new Dufferin Hospital for Women and Children. Calcutta, is nearing completion. It is a modern 3-storeyed building with accommodation for 200 3-storeyed building with accommodation for 200 patients. The planning has been carried out with great care not only to provide the best accommodation care not only to provide the best accommodation possible for the patients but with an eye to economy in space and in administration. A grant of Rs. 1,75,000 was given from the Silver Jubilee Fund towards the re-building of this hospital. Funds are still to be raised for a nurses' home, servants' quarters, hospital kitchen

and a laundry.

It is very satisfactory to record that the Dufferin authorities at Amraoti have at long last realized their

dream of building a new hospital. It is hoped that it will be completed shortly. At present the new buildings will only accommodate 50 patients, but the site is such a spacious one, there is ample space for expansion in the future. The nurses' home is an appealent building and head head planned with constant. excellent building and has been planned with care and forethought for the comfort of the nursing staff. A building grant of Rs. 30,000 was sanctioned from the Silver Jubilee Fund.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1937. VOLUME II

PRINCIPAL DISEASES AFFECTING THE BRITISH HEALTH OF THE ARMY IN INDIA DURING 1937

1937 has been, from the health aspect, a good year for both British and Indian troops. There was a reduction in hospital admissions among both groups as compared with 1936 (also a good year), of 14.3 per 1900 of themselves British troops and 27.0 per 1,000 of strength among British troops, and 37.0 per 1,000 of strength among Indian troops. The admission ratio appears generally to be on the downward trend and although an improvement on that of previous decades (in 1920 it was 1,071.5 per 1,000 for British troops and 762.3 per 1,000 among Indian troops), cannot be considered satisfactory according to modern health standards as long as approximately 568 out of every 1,000 British soldiers and 390 out of every 1,000 Indian soldiers are admitted to hospital during the course of a year. When compared with the admission ratio to hospital among the troops in the United King-law the ratio in India is found to be almost exactly. dom the ratio in India is found to be almost exactly double. The reasons are partially climatic, and partially the more primitive methods of sanitation, particularly with regard to conservancy, available not only for the army, but also for the civil popula-tions in contact with them. Education, finance and time are the three main factors concerned given the will gradually to progress up to modern standards. It is satisfactory to record in addition to the drop in hospital admissions a reduction in the average constantly sick, death and invaliding rates.

An encouraging feature during the past few years and particularly during 1936 has been the reduction in incidence of such diseases as malaria and the enteric

group of fevers.

#### Malaria

The malaria incidence during 1937 is the lowest yet recorded for the British troops in India and nearly one-third less than in 1933. The ratio per 1,000 would have been even lower had it not been for an increase of 20 per 1,000 in Western Command. It was estimated that at least 50 per cent of the cases among the Quetta garrison were contracted during the training season, nets not having been used. The incidence in this station rose from 113 (1936) to 194 per 1,000 in 1937.

The low incidence of malaria for all-India was undoubtedly helped by favourable weather conditions, undoubtedly helped by favourable weather conditions, particularly in the north. In that area August was an unusually dry month, and in July and October there was rather less rain than usual. Cold weather also set in earlier in the autumn than is customary. In the Eastern Command, the monsoon was late, deficient in certain areas and patchy in others.

The ratio per 1,000 of relapses for all-India is also just less than half of that in 1933, and there is little doubt that this is mainly due to the plasmoquine now invariably combined with quinine or given after the

atebrin course of treatment

Treatment was carried out sometimes with quinine and plasmoquine but mainly now with atebrin followed by plasmoquine. In view of the shorter course of treatment involving a briefer stay in hospital the latter combination is more generally favoured in the military hospitals. This method of treatment is supplemented in some instances by quinine alone for the first 48 hours, with a view to the more rapid reduction

in temperature, which in certain cases occurs with quinine. On the other hand certain medical specialists with great experience in both methods of treatment, have expressed the view that as long as pyrexia causes no anxiety, preliminary quinine is unnecessary, and that patients, to whom quinine is not administered initially, look fitter at the end of their course of treatment.

#### Enteric group of fevers

The incidence for British troops is well below that of 1934, which was the lowest ever recorded, and less than half that of 1936 which was also low. The reduction in the number of paratyphoid A cases is also welcome as in the past few years the total cases, although comparatively few, had not diminished in similar proportion to the typhoid cases.

Three deaths occurred among the typhoid cases (two broncho-pneumonia, one severe bronchitis and myo-

The incidence among Indian troops was not as low as in 1936 although less than half that in 1934, the record year at that time. Enteric fevers were severe in many parts of India during the year, particularly in the Punjab, and the seven typhoid and nine paratyphoid cases more than in 1936 undoubtedly reflect the incidence among the civil population with whom naturally contact is greater among Indian than British troops. Several of the infections were actually contracted while on leave in villages.

#### Fevers of the typhus group

Twenty-nine cases occurred among British troops as compared with 44 in 1936. In addition 43 cases were diagnosed among Indian other ranks, four less than in 1936. Again the cases fall into the two main groups of scrub typhus (Proteus OXK) and urine typhus (Proteus OX 19), with a smaller number giving definite diagnostic high titres of agglutination to Proteus (OX 2); finally an even smaller number in which although the clinical symptoms were typical no adequate serological evidence was obtained, or else a general rise in agglutination titre prevented definite classification.

Dysentery, diarrhæa, colitis and amæbic hepatitis

The dysentery admission ratio for all-India has again slightly increased by 0.9 per 1,000. Concurrently the diarrhea and colitis group were slightly reduced, bringing the ratio of admissions for this whole group similar to that of previous years. Commands showing increased dysentery figures were Northern, Eastern and Southern. In Western Command although there is a reduction on the previous year's figures, the ratio per 1,000 was still high (28.44 per 1,000).

#### Effects of heat

In 1937 there were 15 cases (0.3 per 1,000) of heat stroke with six deaths and 37 cases (0.8 per 1,000) of heat exhaustion with and 39 cases (0.7 per 1,000) of heat stroke with three deaths and 39 cases (0.7 per 1,000) of heat exhaustion with one death with one death.

Heat stroke and heat exhaustion cases responsible for many catastrophies among British troops some years ago have been considerably reduced in number. This ago have been considerably reduced in number. group numbered 212 in 1926. In 1937 there were 52. There is less tendency now to shut up troops during the hot hours of the day, and the modern soldier has little interest in cleaked. little interest in alcoholic liquors, as compared with his forebears. Both factors are probably concerned in reducing the incidence of these cases.

Dengue and sandfly fever

Dengue.—There was a very marked increase in the total amount of dengue fever during the year but this was due to an epidemic in Calcutta which started in July and continued up to the end of October. Calcutta being in the Ganges delta and near the coast is subject to periodic anidomics. is subject to periodic epidemics of dengue and the last occurred in 1931.

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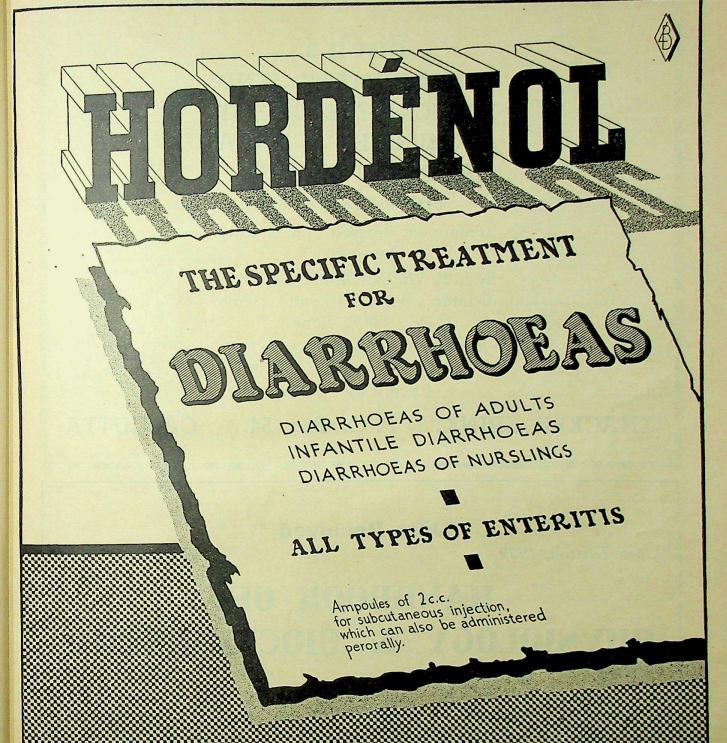
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There were a few sporadic cases in April, May and June but in the middle of July the numbers increased. The epidemic reached its peak in September and

subsided by the end of October.

About 40 per cent of the British troops in Calcutta were affected and 237 of the British cases occurred in Fort William. Indian troops in Alipore were affected but to a much less extent. Many civilians living in

Calcutta were also victims of the epidemic.

Sandfly fever.—The very marked reduction in the incidence of this disease was due largely to the decrease in Northern Command where intensive anti-sandfly measures were carried out during the year. The Assistant Director of Hygiene and Pathology, Northern Command, reports that the greatest reduction occurred at stations where the campaign was most intensive, the exceptionally good results at Landikotal having followed a most conscientious application of active sandfly measures.

#### Oriental sore

There, were only 12 cases among British troops in 1937 but there were 132 cases among Indian troops. This is a considerable reduction on last year when there was an epidemic in Quetta. This year there were only one British and three Indian cases in Quetta.

#### Cysticercosis

Four cases occurred among British troops during the year of which two were at Secunderabad and one each at Jhansi and Peshawar. Two of these cases were invalided, and two have been kept under observation. One of the cases had a previous history of *Tænia saginata* infestation in 1930, presumably an incorrect diagnosis. The three other cases gave no history of previous tape worm infection.

#### Diphtheria

There were no epidemics of any size. In Peshawar 12 cases occurred in the autumn, and 12 were also reported from Waziristan. The greater number of cases were from Southern Command and small outbreaks continued in Poona and Kirkee among the school children. Active immunization of the children with T. A. F. was continued from 1936. One case of diphtheria unfortunately occurred in an immunized child which somewhat discredited the process in the eyes of parents. There was one death in a child in Belgaum, which was seen for the first time when

stridor had developed after a two-day history of sore throat. The child died after tracheotomy had been performed, but a laryngeal swab post mortem was positive to virulent C. diphtheriæ. Only two cases occurred among Indian other ranks during the year, a striking difference to the annual numbers of cases among British troops and families.

#### Cerebro-spinal fever

Only one case occurred among British troops (Ranikhet) during the year. The case recovered. Another case was reported from Cawnpore, but although an undoubted meningitis, it was not caused by the meningococcus.

There were 17 cases among Indian other ranks and five among followers, the total being the same as in 1936. Thirteen of these cases died. Twenty-one of the cases were treated with Lister Institute concentrated

#### Smallpox

There were thirteen cases of smallpox in 1937 compared with eight in 1936. There were seven cases and one death among British other ranks, two cases and no deaths among British officers' wives, two cases and one death among British other ranks wives and two cases and no deaths among British other ranks children. All had been vaccinated, but in two cases repeated vaccination had been unsuccessful. Of the two cases that died the British other rank had been vaccinated that died the British other rank had been vaccinated in 1936, but the British other rank's wife had been vaccinated only at birth.

#### Respiratory diseases

The admissions for respiratory diseases were slightly higher than in the previous year, being 24.2 per 1,000 in 1937 compared with 23.2 per 1,000 in 1936. There were 101 cases of lobar pneumonia with only two deaths as against 132 cases and 14 deaths in 1936. The incidence of lobular pneumonia and pleurisy showed little change, but there were fewer cases of bronchitis.

#### Tuberculosis

There were 61 admissions for pulmonary tuberculosis and seven for tuberculosis other than pulmonary compared with 57 and nine respectively in the previous year. One death occurred from pulmonary tuberculosis. The cases were evenly distributed throughout India and there was no particular unit with undue prevalence.

#### Correspondence

#### CHRONIC SNAKE-BITE

To the Editor, THE INDIAN MEDICAL GAZETTE

Sm,—The letter in your June number about the chronic snake bites was read by me with great interest. I have heard of a large number of such cases myself. One of my own relations was bitten year after year by snakes for many years. I have recorded many cases similar to the one mentioned in the *Indian Medical* 

Such incidents are heard very commonly in the Punjab. I have been trying to enquire if any such incidents are reported in Bengal and Madras, where also poisonous snakes abound; but so far nobody has reported any cases similar to chronic snake bites in these provinces. Is it possible that certain type of snakes which gives such bite are only isolated in the Punjab? In the Punjab, it is alleged that a particular type of snake known as Domethan (meaning double ype of snake known as Do-muhan (meaning double headed in which both the caudal and cephalic ends look like heads) is responsible for such bites. This snake is said to be a non-poisonous female snake. If this type of snake bites particularly during her heat (mating season) or during egg-laying period then the

victim is bitten repeatedly during that period every year, and in worse cases even on the same dates every month. Some persons allege the bite is influenced by particular phases of the moon. It is said that during that period a particular type of smell is emanated by the victim which attracts male snakes exactly as if they would be attracted by a female snake during her mating season. The male snake therefore comes and inflicts a non-fatal bite to the person. The usual treatment suggested to their victims is said to be mantras (charms) by the snake charmers or tying a snake stone as an amulet, etc. An amulet may be made of the skin of Mar-khor (a type of snow deer which eats snakes) or taming of mongoose. Snakes have a great fear and aversion for all these and so leave the victim

Whether all these are only fibs or there is any spot of truth in it is difficult to say. I would appreciate it very much if readers would enlighten and inform me if they have heard such stories. Information on the following points will be appreciated. (1) What is a Domuhan snake? (2) Is it male or a female and of what species? (3) I will be very glad to have such a specimen for identification and classification, if anybody

could send me one. (4) Is the subsequent bites to those victims from a special species of snake? (5) What is their sex, and are they poisonous or non-poisonous? (6) Is it possible for the victim to acquire any abitactic properties and attract snakes posiodically? any ophitactic properties and attract snakes periodically?

Recently I had a patient, a German lady, 35 years age, who was bitten by an Echis carinata snake on the dorsum of foot, through woollen socks at midday in Bombay. A tourniquet was applied and the wound was sucked but by the time she received in homital ker foot sucked, but by the time she reached in hospital her feet and leg were swollen and later on her left side of the body and left side of face was swollen, followed by mild paralysis of the latter. Since then she has been feeling much pain in the legs and her limbs are weak and shaky. Another curious phenomenon noticed by her is that since lately she has been not only dreaming of but actually seeing lots of snakes. In her own words, she attracts snakes. She has seen snakes in her own house, on the golf links, etc., and in places where snakes were never noticed before. She came to the Calcutta School of Tropical Medicine for treatment. She was given six injections of cobra venom from 1 to 10 mouse units followed by another course of six after a fortnight's rest. Her pain disappeared and she has seen no snake since the treatment, for over six months.

It is possible that if any such ophitactic tendency has been developed in her it has been cured by small doses of venom which act as substitute to actual snake bites or by developing antiserum in her. Her pain was also relieved due to neurotoxic action of snake venom.

> Yours, etc., J. S. CHOWHAN, CAPTAIN, M.B., B.S., A.I.R.O.

BIOCHEMICAL STANARDIZATION LABORATORY, ALL-INDIAN INSTITUTE OF HYGIENE,

To the Editor, The Indian Medical Gazette Sir,—I have to refer you to page 380 of your Gazette of June 1939 where a case of Mr. P. L. is reported. I have a similar female case in my family. She has had 16 bites and continues to have them at intervals of sometimes a year, sometimes six months, and recently only a month.

Will you please inform me if you have received any

useful suggestions.

Yours, etc., BISHAN DASS.

PATHANKOT, PUNJAB, 15th November, 1939.

(Extract from Chapel Hill Weekly, Chapel Hill, North Carolina, dated 29th September, 1939)

#### MRS. BROWN, SORRY FOR MAN IN THE PUNJAB, SAYS SNAKES WON'T BITE HIM ANY MORE IF HE'LL RUB HIMSELF WITH OIL OF PENNYROYAL,

This newspaper published last week a letter from the Indian Medical Gazette of Calcutta, India, sent us by Dr. William P. Jacocks, which told of a man in the province of the Punjab, a relative of one Ishar Das, who was bitten by a snake every month in spite of various precautions. 'I most earnestly request.' Mr. Das wrote, 'that you will kindly help me in recommending any treatment for this complaint'. The editor of the Gazette appended to Mr. Das's letter the note: 'We invite opinions, including those of regularization.'

psychologists.

We haven't received any opinions from psychologists yet, but Mrs. Inez Brown, who lives on Columbia street at Mrs. Wallace Patterson's, called up yesterday and said that she knew why Ishar Das's relative was being regularly snake-bitten and that she'd be glad

to explain it to a representative of the Weekly. Fear is the answer', Mrs. Brown said, when I was seated near her in a comfortable rocking chair on Mrs. Patterson's porch. The letter spoke of the man's "fear of being bitten". Any expert animal trainer will The letter spoke of the man's tell you that when a man is afraid he gives off an odour of fear which is easily detected and recognized by animals and reptiles.

'Fear is the most contagious of the emotions, and when an animal detects fear in a man it becomes excited and is likely to attack. That is why normally friendly dogs often attack people who fear them, and it is believed to be the explanation of why the Hopi Indians can handle, without being bitten, deadly rattle-snakes which would kill a white man. The Indians are not afraid and therefore the snakes are not afraid and can be handled.

Lawrence Trimble, who has made a fortune training dogs for the movies, was dreadfully afraid of them until he read or heard about the contagious odour of fear. He then began schooling himself not to fear dogs, and it was after he had lost fear that he became

a famous dog trainer.
'It was no doubt a coincidence that Mr. Das's relative was first bitten at regular intervals. But it made him expect to be bitten every month thereafter, and his consequent fear of being bitten caused him to give off the scent of fear, and that scent is what is causing the snakes to bite him.

'A friend of mine in New York state was similarly troubled by snakes biting her. She was never able to overcome her fear, but she read that the scent of oil of pennyroyal would destroy the scent of fear, and

she tried it and was not bitten any more.
'When I read the letter in the Weekly I called you up because I felt so sorry for the poor fellow in India, and I wanted to let him know what would help him. The snake will quit biting him if he will rub himself with oil of pennyroyal whenever he begins to fear he is about to be bitten. And, in time, he may lose his recurrent fear and its accompanying fear odour and

may then stop using the pennyroyal.

'If you put this in the Weekly I hope Dr. Jacocks sees that it gets to Ishar Das and that Ishar Das shows

it to his unfortunate relative.'-Joe Jones.

#### A CURE FOR SCORPION STINGS

To the Editor, THE INDIAN MEDICAL GAZETTE

Sr,—I have read with great interest the letter of Dr. Mudaliar that has appeared under the above heading in the November 1939 issue (p. 715) of your journal.

About 18 years ago when I was at Banbassa (Teral forest) in connection with the Sarda Canal works, I came across many hundreds of cases of scorpion sting. Almost every day dozens of men from the labouring class used to come smitten with intense pain caused through the sting of this venomous creature. Scorpions abounded in that region and some of them were indeed very big (9 to 10 inches in length) and dark in colour. The people there used to fear these insects as much as they did the snakes. The symptoms varied widely in severity from mere local pain and burning to the most excruciating pain of a radiating character with severe constitutional disturbance. It was nitiful to see severe constitutional disturbance. It was pitiful to see some of them writhing with pain and actually rolling on the ground in area. on the ground in agony.

I gave extensive trial to most of the remedies commonly recommended for the purpose, viz, solution of ammonia, phenyl, permanganate of potash, paste of ipecacuanha root, and injection of cocaine. The last remedy was found to be the only one which could be called satisfactory, provided the injection was given quite close to the site of the sting. Englished was given quite close to the site of the sting. For experience I found that this was not always possible, as in a severe case the pain was not always and diffuse that it was not usually possible to locate the exact site of the sting.

exact site of the sting.

It was by chance that I found out a very simple treating a severe case of scorpion sting, all the methods that I proved futile. Then I decided to put him under remedy for this painful condition. While treating

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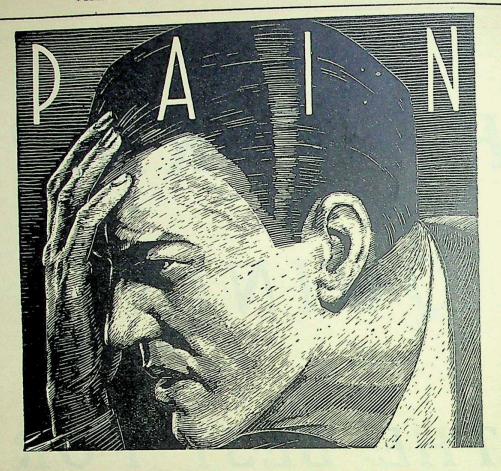
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chloroform, as he was beginning to show signs of severe constitutional disturbance, viz, convulsion, hurried breathing, exhaustion, etc. To my great surprise I found that after a few whiffs of chloroform all the symptoms—distress and pain—vanished like magic, and there was no need to push the chloroform any further to induce general anæsthesia. The relief was so prompt and complete that I could hardly believe my eyes. To convince myself I tried this meaning result.

From that time onward I have used this simple remedy in many hundreds of cases with uniform success. I would invite your readers to give this

method a fair trial.

The most interesting point about the treatment is that a very small quantity of chloroform is required to effect a cure. About 2 drachms will be sufficient to give relief to more than fifty patients. I usually keep a little chloroform in a small phial and ask the patient to inhale it a few times from the phial until he gets complete relief. This does not take more than complete 30 seconds.

I have tried ether and alcohol in the same way but

have not found them so effective.

Yours, etc.,

G. GHOSH, M.B., B.S., D.T.M.

8, MINTO ROAD, ALLAHABAD, 26th November, 1939.

#### M. & B. 693 IN INDIAN STRAINS OF MALARIA

To the Editor, The Indian Medical Gazette Sir,—I will be very glad if you will kindly allow me some space in your esteemed journal to say something about M. & B. 693 in the cases of malaria. I have gone through the article 'M. & B. 693 in Indian Strains of Malaria' in the *Indian Medical Gazette*, Vol. LXXIV, November 1939. The authors have said that M. & B. 693 has definite action on malarial parasite if continued for 5 to 6 days in doses 4 gm. daily. But may I ask you why malarial parasites

become positive after treating pneumonia by M. & B. 693, although the course of treatment con-M. & B. 693, atthough the course of treatment continued for 5 days and in all 30 tablets were given in each case? I like to mention here three cases who were attacked with pneumonia, aged 25 years to 30 years, and who complained of fever, pain in the chest and cough. On examination I found temperature 103°F., pulse 120 per minute, respiration 55 per minute. The lower lobe of the right lung showed signs of consolidation and scattered râles and rhonchi all over the lungs. I have treated them with M. & B. 693. The treatment began in the following way, at the beginning 4 tablets at a time every 4 hours for 12 hours, then 2 tablets at a time every 4 hours for 12 hours, then one tablet thrice daily for 4 days. In all cases the temperature dropped down to 97°F. within 24 hours and ran normal as long as the course of M. & B. 693 was continued. But the day when the treatment is stopped they all had sudden rise of temperature up to 104°F. Blood was taken for malarial parasites and in each case malignant tertian parasites were positive. Then they were treated with atebrin and were cured.

In all cases total days treatment with M. & B. 693 was 5 days and in each case 30 tablets of M. & B. 693

were given by oral administration.

I am very much grateful to Dr. E. G. Michaelson, M.B. (Aberdeen), Group Medical Officer, Chulsa Medical Association, for his kind help and advice in all these

Yours, etc., KANAI LAL CHATTERJEE, L.M.F.

MOORTEE TEA ESTATE, MATELLI P. O. (DOOARS), 28th November, 1939.

[Note.—There does not seem to be any contradiction here. In the paper in our November issue it is stated that daily doses of 4 gramme each for 5 or 6 days (= 20 to 24 grammes or 40 to 48 tablets) caused disappearance of malarial parasites: our correspondent only gave 30 tablets.—Editor, I. M. G.]

#### Service Notes

#### APPOINTMENTS AND TRANSFERS

THE VICEROY AND GOVERNOR-GENERAL has been pleased to make the following appointments on His Excellency's personal staff, with effect from the dates stated:-

To be Honorary Surgeons

Colonel H. Stott, O.B.E., vice Major-General G. G. Jolly, C.I.E., K.H.P., vacated. Dated 30th August, 1939. Colonel E. S. Phipson, C.I.E., D.S.O., vice Colonel J. Taylor, C.I.E., D.S.O., vacated. Dated 30th August, 1939. Colonel F. F. S. Smith, vice Colonel J. A. S. Phillips, C.I.E., K.H.P., vacated. Dated 6th October, 1939. C.I.E., K.H.P., vacated. Dated 6th October, 1939.

C.I.E., K.H.P., vacated. Dated 6th October, 1939.

Colonel E. G. Kennedy to be A. D. M. S., Madras District. Dated 22nd October, 1939.

Colonel J. S. S. Martin to be Officiating A. D. M. S., Deccan District. Dated 22nd September, 1939.

Colonel A. C. Macrae to be O. C., Indian Military Hospital, Rawalpindi. Dated 1st October, 1939.

Colonel G. R. Lynn, D.S.O. (Retired), to be O. C., I. M. H., Jubbulpore. Dated 30th September, 1939.

Brevet-Colonel J. W. Vanreenan, O.B.E., to be O. C., C. I. M. H., Abbottabad. Dated 3rd October, 1939.

Lieutenant-Colonel N. D. Puri, Inspector-General of Prisons, Punjab, has been advanced to the higher position of his, rank (selected list), with effect from the 17th August, 1939.

Lieutenant-Colonel R. K. Tandon to be O. C., I. M. H., Allahabad. Dated 8th September, 1939.

Lieutenant-Colonel D. V. O'Malley, O.B.E., to be O. C., I. M. H., Sialkot. Dated 1st October, 1939.

Lieutenant-Colonel R. V. Martin, C.L.E., to be O. C., C. I. M. H., Wana. Dated 23rd October, 1939.
Lieutenant-Colonel R. Lee to be O. C., I. M. H., Meerut. Dated 1st October, 1939.
Lieutenant-Colonel P. Savage to be O. C., I. M. H., Bareilly. Dated 30th October, 1939.
Lieutenant-Colonel H. Das to be O. C., I. M. H., Delhi. Dated 30th September 1939.

Delhi. Dated 30th September, 1939. Lieutenant-Colonel I. S. Nalwa, Officiating Inspector-General of Prisons, on transfer, made over, and Lieutenant-Colonel J. Findlay on being recalled to duty received charge of the duties of the Inspector-General of Prisons, Burma, on the afternoon of the 3rd October, 1939.

Lieutenant-Colonel G. C. Maitra made over and Lieutenant-Colonel R. H. Malone, on being recalled to duty, received charge of the duties of Pathologist, General Hospital, Rangoon, and Lecturer in Pathology, Burma Government Medical School, on the forenoon of 3rd October, 1939.

of 3rd October, 1939.

Lieutenant-Colonel W. J. S. Ingram, on being recalled to duty, assumed charge of the Civil Surgeoncy at Prome on the afternoon of the 5th October, 1939.

Lieutenant-Colonel J. H. Barrett, on being recalled to duty, assumed charge of the duties of the Civil Surgeon, Mergui, on the forenoon of the 13th October,

Lieutenant-Colonel J. P. Huban, O.B.C., an Agency Surgeon, is employed as the Administrative Medical Officer in Rajputana, with effect from the forenoon of the 30th October, 1939.

Lieutenant-Colonel R. F. D. MacGregor, C.L., M.C., is appointed to officiate as Chief Medical Officer and Civil Surgeon, Delhi, with effect from the 2nd November, 1939 (forenoon), until further orders, vice Major A. W. Ebden, I.M.s. (since deceased). Major D. Kelly, Civil Surgeon, Raipur, is transferred

Surgeon and Superintendent, Robertson

Civil

Medical School, Nagpur.
Major V. E. M. Lee to be O. C., I. M. H., Bakloh.

Dated 2nd October, 1939.

Major T. A. Malone to be D. A. D. M. S., A. H. Qrs. Dated 3rd September, 1939.

Major G. Dockery was transferred to the Semi-

Effective List. Dated 18th September, 1939.

Major T. C. Puri to be D. A. D. P., Peshawar District. Dated 21st September, 1939.

Major H. W. Farrell, an Officiating Agency Surgeon, is employed as C. M. O., and Inspector-General of Prisons in Baluchistan, with effect from the forenoon of the 4th October, 1939.

Major E. A. O'Connor, an Officiating Agency Surgeon, appointed as Civil Surgeon, Quetta, Sibil with

geon, is appointed as Civil Surgeon, Quetta-Sibi, with effect from the forenoon of the 5th October, 1939.

Major G. J. Smith made over and Captain H. B. MacEvoy received charge of the executive and medical charge of the Insein Central Jail, on the

forenoon of the 5th October, 1939.

Major P. A. C. Davenport, on transfer, received charge of the executive and medical charge of the Mandalay Central Jail, on the forenoon of the 10th

October, 1939. Major R. McRobert, on being recalled to duty, assumed charge of the duties of the Civil Surgeon,

Monywa, on the forenoon of the 12th October, 1939.

On return from China, Major K. Rai joined the
I. M. H., Lansdowne, for duty, on 30th October, 1939. On the completion of his tour of duty at Murree, Major B. Temple-Raston assumed charge of the office of Civil Surgeon, Attock District, Campbellpur, on the afternoon of the 3rd November, 1939.

Captain F. C. Leach, Civil Surgeon, Saugor, is transferred as Civil Surgeon, Raipur.

Captain I. W. B. Sashina initial military applies in

Captain J. W. R. Sarkies joined military employ in

Burma, on the 14th September, 1939.

The undermentioned short service R. A. M. C. Officers have been granted permanent commissions in the I. M. S .:-

Captain F. J. O'Dowd. Dated 25th September, 1939. Captain C. S. Gamble. Dated 20th October, 1939. Captain J. G. Stonham reverted from Civil Burma.

Dated 29th September, 1939.
Captain J. H. Cater to be Officer-in-Charge, Brigade Laboratory, Bannu. Dated 29th September, 1939.
Captain W. W. Laughland to be Mental Specialist, Eastern Command. Dated 1st September, 1939.

Captain J. G. Stonham to be Specialist in Ear, Nose and Throat Diseases, Southern Command. Dated 1st October, 1939.

Captain E. J. Somerset to be Specialist in Ophthal-mology, Western (Ind.) District. Dated 26th October,

Captain H. B. MacEvoy made over and Lieutenant-Colonel I. S. Nalwa received executive and medical charge of the duties of the Rangoon Central Jail, on the forenoon of the 4th October, 1939.

New Appointments:—Captain R. L. Raymond, Ophthalmic Surgeon, General Hospital, Rangoon, on transfer, made over and Lieutenant-Colonel H. S. Cormack, I.M.S., on being recalled to duty, received charge of the duties of Ophthalmic Surgeon, General Hospital, Rangoon, on the forenoon of 3rd October, 1939.

Captain J. Morgan reverted from military Burma.
Dated 5th October, 1939.
Captain H. W. G. Staunton, an Officiating Agency
Surgeon, is appointed as Additional Medical Officer,
Central India, with effect from the afternoon of the
8th October, 1939.
Captain R. L. Raymond, on transfer, assumed charge
of the duties of the Civil Surgeon, Magwe, on the
forenoon of the 12th October, 1939.

Captain R. D. MacRae, an Officiating Agency Surgeon, on return from leave, is appointed as Agency Surgeon, Gilgit, with effect from the afternoon of the The unexpired portion of his leave 12th October, 1939. is hereby cancelled.

Captain M. S. Purvis, on being recalled to duty, assumed charge of the duties of Civil Surgeon, Shwebo,

on the 13th October, 1939.

On completion of his tour of duty at Dalhousie, Captain C. F. Garfit, assumed charge of the Office of Civil Surgeon, Jhelum, on the forenoon of the 1st November, 1939.

On transfer from Sargodha, Captain D. W. Taylor was placed on special duty at the Mayo Hospital, Lahore, with effect from the 9th November, 1939. Lieutenant (on probation) A. S. Brown is restored to

the establishment on 1st September, 1939, with seniority from 1st September, 1938.

The undermentioned newly appointed I. M. S. Officers have arrived in India for duty:-

Lieutenant K. D. Fraser.

Lieutenant J. Aitken. Lieutenant H. Rees Lieutenant D. S. Wilson. Lieutenant R. O. Yerbury.

Lieutenant D. H. Harrison. Lieutenant G. T. M. Hayes.

Lieutenant P. Kent.

Lieutenant P. J. Michelson.
Lieutenant W. M. McCutcheon.
Lieutenant P. J. Wormald.
Lieutenant J. P. O'Riorden.
Lieutenant S. G. Nardell.
Lieutenant A S. Brown.

Lieutenant W. P. D. Griggs.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the following Officers of the Indian Medical Service, with effect from the dates stated against their names:-

Central Government Captain C. J. Hassett. Dated 3rd January, 1939. Major G. Milne Dated 18th January, 1939. Major J. H. Gorman. Dated 6th February, 1939.

Captain H. W. G. Staunton. Dated 28th March, 1939 (afternoon).

Captain T. Somerville. Dated 30th May, (afternoon).

Madras 1939 Captain S. Shone. Dated 17th January, (afternoon).

United Provinces
Captain A. B. Guild. Dated 14th January, 1939.
Captain T. F. O'Donnel. Dated 6th April, 1939.

Punjab Captain D. W. Taylor. Dated 1st June, 1939.

Bihar and Orissa (joint cadre)
Captain A. T. Andreasen. Dated 13th April, 1939

Captain J. D. Murdoch. Dated 9th May, 1939.

The Secretary of State for India has sanctioned the reversion to military employment of the following officers of the I. M. S. (Civil), with effect from the dates mentioned against their names:—

Central Government
Lieutenant-Colonel R. L. Vance. Dated 12th November, 1937.

Lieutenant-Colonel W. M. Will. Dated 31st October.

1938 (afternoon).
Captain C. J. H. Brink. Dated 27th November, 1938.
Colonel E. G. Kennedy. Dated 20th April, 1939.

Major J. S. McMillan. Dated 1st September, 1937. Lieutenant-Colonel C. S. V. Ramanan. Dated 6th November, 1937 (afternoon)

Bombay Captain P. I. Franks. Dated 29th October, 1937 (afternoon)

Captain W. W. Laughland. Dated 4th June, 1938.

# Physiological action of BOVRIL

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Following most acute illnesses there is commonly a depression of gastric secretion, and the secretion is poor in hydrochloric acid. In such cases Bovril helps by stimulating the gastric mucosa and restoring the gastric juice to normal, both in volume and activity.

\*B.M.J., 1937, August 28. Page 412.

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# THE IMPORTANCE OF PRECISION POLISHING

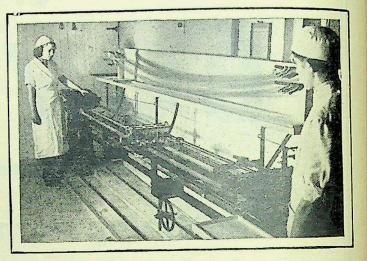
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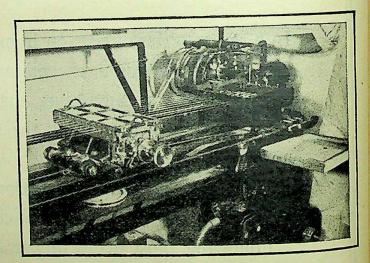
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#### Bengal

Lieutenant-Colonel R. E. Flowerdew, C.I.E. Dated

25th May, 1937.
Major B. N. Hajra. Dated 14th February, 1938.
Major A. K. Gupta. Dated 14th February, 1938.

#### United Provinces

Lieutenant-Colonel B. R. Chaudhri. Dated 17th

April, 1939.
Captain Jaswant Singh. Dated 10th September, 1937.
Major R. D. Alexander. Dated 3rd August, 1938.

#### Bihar

Major G. P. F. Bowers. Dated 4th October, 1937 (afternoon).

Lieutenant-Colonel H. M. Strickland. Dated 10th November, 1937.

#### Central Provinces and Berar

Lieutenant-Colonel R. A. Logan. Dated 20th November, 1937 (afternoon).

Lieutenant-Colonel J. Carrey. Dated 4th March,

Lieutenant-Colonel J. E. Ainsley. Dated 2nd August,

1938 (afternoon).
Major V. E. M. Lee. Dated 19th August, 1938

(afternoon).

The undermentioned A. I. R. O. (Medical) Officers have been called up for service:-

captain D. C. Aggarwal.
Captain H. S. Ahluwalia.
Captain L. S. Ahluwalia.
Captain P. R. Bali.
Captain P. R. Bali.
Captain P. K. Banerji.
Captain P. K. Banerji.
Captain D. S. Bhalla.
Captain Bhawani Dass.
Captain G. S. Bindra.
Captain B. S. Bindra.
Captain Binod Lal Tewar

Captain Binod Lal Tewari.

Captain Binod Lai Tewari.
Captain Boota Singh.
Captain R. N. Bose.
Captain C. P. Chaube.
Captain K. S. Chopra.
Captain M. R. Chowdhury.
Captain D. C. Datta.
Captain K. M. Desai.
Captain L. S. Ferozepuri.

Captain K. M. Desai.
Captain L. S. Ferozepuri.
Captain D. T. P. Gay.
Captain J. S. Gill.
Captain S. K. Ghosh.
Captain S. H. Gokhale.
Captain A. S. Gupta.
Captain Harish Chandra.
Captain Ijaz Ahmad Siddiqui.
Captain Jagdev Singh.
Captain S. P. Jain.
Captain Kapila Sukhdev.
Captain M. N. Kalbagh.
Captain K. C. Kandhari.
Captain N. C. Kapur.
Captain L. R. Kapur.

Captain N. C. Kapur.
Captain L. R. Kapur.
Captain A. R. Kapur.
Captain H. R. Kapur.
Captain S. M. A. Khan.
Captain A. L. Khorana.
Captain N. D. Kotwal.
Captain Khanijo.
Captain Y. N. Lal.
Captain N. G. Latey.
Captain Manohar Lall

Captain Manohar Lall.

Captain G. D. Luthra. Captain A. K. Maitra.

Captain Man Singh. Captain D. P. Mehra

Captain Mohan Singh.

Captain Monan Singn.
Captain A. N. Narang.
Captain S. N. Narang.
Captain G. G. Naolekar.
Captain A. N. Opal.
Captain T. R. Pahwa.
Captain C. D. Pasi.

Captain Pran Nath. Captain T. R. Rangaswami. Captain K. M. Sana.

Captain M. N. Sardana.

Captain G. M. Sekhri. Captain P. C. Sen.

Captain N. L. Sen. Captain S. R. Sethi. Captain Mohammed Sharif.

Captain G. L. Sharma.

Captain L. R. Sharma.

Captain L. R. Sharma.
Captain G. S. Sodhi.
Captain A. C. Sud.
Captain R. N. Sud.
Captain Tara Singh.
Captain V. S. Trivedi.
Captain H. B. Vaid.
Captain M. C. Varma.
Captain Wazir Singh.

Captain Wazir Singh.

The undermentioned retired Officers have been recalled:-

Colonel G. R. Lynn, D.S.O.
Lieutenant-Colonel H. Hingston.
Lieutenant-Colonel R. deS. B. Herrick, D.S.O.
Lieutenant-Colonel F. Oppenheimer.
Lieutenant-Colonel J. A. Sinton, v.c., O.B.E.
Lieutenant-Colonel M. L. C. Irvine.
Lieutenant-Colonel F. W. Hay.
Lieutenant-Colonel J. B. deW. Molony, O.B.E.
Lieutenant-Colonel J. B. deW. Molony, O.B.E.
Lieutenant-Colonel A. Kennedy.

Lieutenant-Colonel R. E. Flowerdew, C.I.E. Lieutenant-Colonel W. O. Walker. Lieutenant-Colonel W. J. Simpson.

Lieutenant-Colonel W. J. Simpson.
Lieutenant-Colonel G. F. Graham.
Lieutenant-Colonel H. K. Rowntree.
Lieutenant-Colonel H. G. Alexander.
Lieutenant-Colonel D. McN. Taylor.
Lieutenant-Colonel S. M. Hepworth.
Lieutenant-Colonel F. Griffith.

Lieutenant-Colonel J. R. D. Webb. Lieutenant-Colonel T. L. Bomford.

Lieutenant-Colonel H. R. B. Gibson. Major S. Gordon, M.c. Major M. Purvis.

Major E. Calvert.
Major E. Calvert.
Major R. W. G. Hingston, M.C.
Major W. L. Forsyth.
Major G. Y. Thomson.
Major V. A. Edge.

#### Leave

Major J. H. Boultbee has been granted a further extension of sick leave up to 31st January, 1940.

Major R. N. Bhandari, on 2½ months' leave from 28th

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Major F. R. W. K. Allen, Civil Surgeon and Super-intendent, Robertson Medical School, Nagpur, has been granted 6 months' leave ex-India on Medical Certificate from 6th November, 1939.

#### PROMOTIONS

The undermentioned Indian Medical Service Officer is advanced to the List of Special Selected Lieutenant-

Lieutenant-Colonel R. F. D. MacGregor, C.I.E., M.C. Dated 30th August, 1939.

Majors to be Lieutenant-Colonels
R. T. Advani. Dated 14th November, 1939.
W. C. McKee. Dated 18th November, 1939.

Captains to be Majors

R. C. Dracup. Dated 6th November, 1939. B. L. Taneja. Dated 19th November, 1939.

To be Captain (on probation)

Francis John O'Dowd. Dated 24th September, 1939, with seniority as Lieutenant from 24th September, 1934 and as Captain from 24th September, 1935.

Lieutenant to be Captain

T. Maung. Dated 29th March, 1939.

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RETIREMENTS

Colonel J. A. S. Phillips, C.I.E., K.H.S. Dated 6th Colonel D. C. V. FitzGerald, M.C., K.H.P. Dated 22nd October, 1939. Lieutenant-Colonel M. D. A. Kureishi. Dated 14th October, 1939.

Lieutenant-Colonel S. A. Phatak. Dated 23rd October, 1939. Lieutenant-Colonel F. R. Thornton, M.C. Dated 5th

August, 1939.

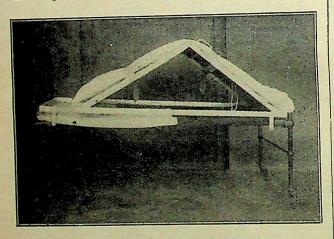
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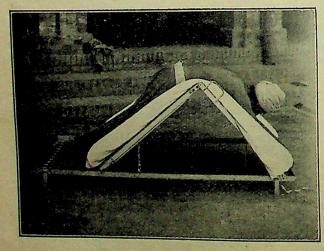
NOTE ON A 'NELSON BED' MADE FOR THE MAYO HOSPITAL, LAHORE. BY ALLIBHOY VALLIJEE—SURGICAL INSTRUMENT MAKERS, MULTAN

The photographs show the 'Nelson bed' frame made by Allibhoy Vallijee recently. It fits an ordinary hospital bed frame and can be made to fit any size of bed. The angle can be varied by slots in the side of the frame.

of the frame.

Nelson at the Brompton hospital, London, first made this type of bed for treatment of cases of bronchiectasis, and lung abscess by 'postural drainage'. The patient is strapped on the bed with his head at a lower level than his chest as shown in the photograph. He remains in this position for several hours, causing the purulent

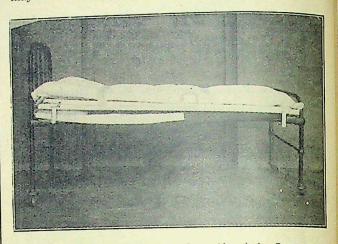




sputum which has collected in the cavities in the lungs and bronchi to be drained from them and coughed up. Patients become accustomed to this abnormal position after a few days and are able to remain in it for many hours of the day.

In the Mayo Hospital, Lahore, it has been used for the 'wet' purulent type of bronchiectasis, and lung abscesses both conditions being fairly common here. The cost of the bed was Rs. 60. Allibhoy Vallijee

may have to increase the price because of the War.



I wish to thank Mrs. Bharucha, wife of the Inspector-General, Civil Hospitals, Punjab, for collecting the money for the beds and for her enthusiasm in arranging for them to be made.

G. F. TAYLOR, MAJOR, I.M.S., Professor of Clinical Medicines.

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#### Original Articles

#### CIRCULATORY FAILURE IN TYPHOID FEVER

By GERARD KELLY, F.R.C.P.(1.) MAJOR, I.M.S.

Professor of Clinical Medicine, Medical College Hospitals, Calcutta

In a former paper reference was made to the central contribution to circulatory failure in typhoid fever made by myocardial weakness due to toxemia and to impairment of the coronary circulation by severe grades of peripheral failure (Murray and Kelly, 1938). Peripheral failure in typhoid fever, and the total clinical picture of circulatory failure in severe cases will be the subjects of the present communication.

An insufficient blood flow to the body is responsible for the main clinical features of circulatory failure in typhoid fever. Hence we may briefly recall the conditions necessary for an adequate blood supply to the tissues. The primary requisites for an adequate blood supply to the tissues are a normal cardiac income and normal contractile power of the cardiac pump. The filling of the heart is dependent upon the venous pressure which usually rises and falls with increase and decrease, respectively, of the circulatory blood volume. The blood supply to the heart and brain depends mainly upon the arterial blood pressure. And the arterial blood pressure in turn is a function chiefly of the output of the heart and of the peripheral resistance. The tone of the arterioles determines the peripheral resistance. Fishberg (1937) states that the blood pressure is more readily influenced by changes in the calibre of arterioles than by variations in the output of the heart or in the viscosity of the blood. The cardiac output is controlled by three factors, namely (1) the venous return, (2) the force of the heart, and (3) the heart rate.

#### Dual failure

Clinically, circulatory collapse in severe typhoid fever is a dual failure, characterized by outspoken peripheral and occult central failure. On ward rounds I have repeatedly emphasized the shock-like picture presented by such cases, due to a disparity between the circulating blood volume and the functioning capacity of the vascular bed. 'In peripheral failure the circulating blood volume is diminished and the capacity of the vascular bed is increased with resultant pooling of blood in the periphery' (Fishberg, 1937). With this decrement in the circulating blood volume, there is a corresponding fall in the venous pressure with consequent decrease in the cardiac output, which is further reduced, because of the impairment of contractility of the heart due to typhoid myocarditis. To combat the resultant steep fall of blood pressure the decrease in circulating blood volume provokes constriction of the peripheral arterioles. The cold clammy skin is due, according to Harrison (1939), to diminished blood flow to the skin because of the decline in the cardiac output and the local vaso-constriction. The grey cyanosis (pallor plus cyanosis) proclaims stagnation of blood at the periphery. In the dual failures of typhoid fever and coronary thrombosis (Levine, 1929), the coldness of the skin affords a striking contrast to the high rectal temperature obtainable in these cases. Circulatory collapse in enteric is not to be attributed to vaso-motor paralysis, which is the result, rather than the cause, of the fall of blood pressure. When the latter falls below 60 or 70 mm. the vaso-constrictor mechanism fails owing to ischæmia of the vaso-motor centre, vaso-dilatation supervenes and a further final fall in blood pressure results. Death ensues in a few hours if the blood pressure is not successfully restored to an adequate level. Impending circulatory failure is usually notified at an earlier stage in the temperature chart, which shows replacement of the characteristically slow pulse by a tendency to tachycardia linked with decline in the height of the fever. About the same time there may be a slight rise in blood pressure due to peripheral vaso-constriction, which rise in the blood pressure is to be interpreted as the prelude to a sharp fall.

Feeble pulse, rapid heart rate, distant heart sounds and even fætal heart sounds occur equally in peripheral failure and in acute myocarditis. The changes undergone by the first heart sound in severe enteric fever, however, are to some extent due to a coexisting myocarditis. Temporary gallop rhythm is even more suggestive of a transient myocardial weakness. In grave circulatory collapse the heart sounds may be almost inaudible, the blood pressure unregisterable, the pulse almost or quite impalpable and the superficial veins totally collapsed. The development of an apical systolic murmur suggests acute cardiac dilatation. The development of cardiac enlargement under radiological observation would constitute direct evidence of acute myocarditis. Unfortunately, radiological study of the heart in typhoid is rarely possible. Fishberg (1937) tells us thatthe heart is not enlarged in pure shock. On the contrary there is every reason to believe that characteristically the heart diminishes in size as a result of the deficient filling due to the small venous returns'. Most commonly in severe cases the typhoid heart gives the palpating finger the impression of at least a full-sized heart, even after allowing for upward diaphragmatic displacement by the commonly prevailing meteorism and after exclusion of other possible causes of cardiac enlargement such as hypertension, organic valvular disease, etc. 'Electrocardiographic evidence of myocardial damage is not

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rare' (Fishberg, 1937), especially prolongation of the P-R interval and T-wave inversion in lead II and sometimes in lead I also. Such T-wave changes are to be differentiated from those due to digitalis by the fact that the QRS is followed by a horizontal or upwardly-convex RS-T segment which in turn is followed by the inverted T.

#### Prognosis

Within the past six months we have had three cases of severe typhoid fever with circulatory failure as described above. Two of the cases, males aged 24 and 30 years, respectively, of average constitution, made a good recovery without further complications of note. The third case, an obese man of 40, terminated fatally: 48 hours before death two of his stools were tinged with blood but the third and last stool was blood-free.

The prognosis is favourable in previously healthy young people. Middle-aged and elderly subjects, and more especially those who are obese as well, frequently succumb to the circulatory

failure of typhoid fever.

#### Summary of treatment

The aim of treatment in the circulatory failure of typhoid fever is obviously to increase the volume of the circulating blood, to decrease the capacity of the vascular bed and to diminish cerebral anæmia.

Increase the volume of the circulating blood

Intravenous glucose saline, by the drip method, in view of the state of the heart, is the most certain procedure in the circulatory collapse of typhoid fever. We give subcutaneous glucose saline immediately signs of impending circulatory failure appear: in profound circulatory depression absorption by this route is inadequate.

In toxemic peripheral failure cortin helps to prevent water and salt depletion and thus inhibits the rise in serum potassium associated with concentration of the blood. Thomson (1939) demonstrated the toxic action of potassium salts, particularly on the myocardium, and rightly advises against the use of potassium salts in cases of cardiovascular disease and chronic nephritis, the commonest conditions in which potassium citrate has been hitherto prescribed. The suprarenal cortex, moreover, contains ascorbic acid (or vitamin C) which helps to restore normal capillary resistance. In Addison's disease the chloride content of the body is characteristically low, hence sufferers from this affection receive a daily ration of sodium chloride as part of their routine treatment; intravenous 5 per cent NaCl with glucose is effectively employed in the crisis of Addison's disease. In 1936, Bernhardt stated that he found intravenous cortical hormone and vitamin C more effective than camphor, cardiazol or

coramine in the circulatory collapse of malignant diphtheria. He used intravenous injections containing the following:—

Adrenal cortical hormone ... 10 c.cm.

Vitamin C preparation ... 2 ,,

Glucose (10 per cent) ... 20 ,,

NaCl (5 per cent) ... 5-10 ,,

Small repeated doses are better than a single large one. This procedure should be followed immediately the enteric case manifests signs of

impending circulatory failure.

Deficiency of vitamin B<sub>1</sub>, according to Weiss and Wilkins (1936), tends to produce hypersensitivity of the carotid sinus reflex and consequently attacks of peripheral vaso-dilatation with faintness or unconsciousness, which attacks do not seem to be a feature of the circulatory collapse of typhoid.

Decrease the capacity of the vascular bed by vaso-constrictor drugs

In view of the existing constriction of the peripheral arterioles, the physician must not rely overmuch upon vaso-constrictor drugs, such as adrenalin, ephedrine, camphor in oil and caffeine sodium benzoate, to mention those employed in our wards. We generally give them parenterally in rotation at say six-hourly intervals, in each

case according to requirements.

Other drugs.—The general practitioner of today employs coramine in all conditions of circulatory adversity. Coramine has at least ousted the practitioner's old-time favourite in circulatory emergencies, namely, the hypodermic injection of digitalis and strychnine. As may be expected in predominantly peripheral circulatory failures, the main indication for digitalis therapy, that is congestive heart failure, is clinically inevident in the vast majority of enteric Digitalis cases with circulatory collapse. actually decreases the circulating blood volume and hence is emphatically contra-indicated in shock (peripheral circulatory failure) due to any cause. Moreover, when a patient is febrile, the efficiency of digitalis is impaired even in the presence of downright indications for its employment. It may even be harmful to the myocardium already damaged by the toxemia of enteric fever. Finally, according to Johnson and Gilbert (1931) a hazard of sudden death attends the use of ephedrine in cases receiving digitalis: these observers advise extreme caution in the use of adrenalin in such circumstances. And adrenalin is the most reliable of all drugs in cardiovascular emergencies. We never use strychnine in the circulatory collapse of typhoid fever: for one thing it stimulates intestinal movements, for another its effective dose is heroic.

Other measures.—The patient should be kept as flat as possible, the pulmonary state permitting. Raising the foot of the bed and thus displacing the inflamed enteric bowel upwards with

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to the oxæmia Johnson i death eceiving. caution stances. ll drugs ver use typhoid testinal dose is be kept permithus disrds with FURTHER LIGHT ON THE MECHANISM OF SANDFLY TRANSMISSION KALA-AZAR\*

> By R. O. A. SMITH K. C. HALDER

> > and

#### I. AHMED

(Kala-azar Enquiry under the Indian Research Fund Association at the Darbhanga Medical School, Bihar)

THE method of re-feeding Phlebotomus argentipes to keep them alive under laboratory conditions for the experimental transmission of kala-azar was first described by Shortt, Barraud and Craighead (1926a) and till the inception of the present series of transmission experiments

(Continued from previous page)

resultant further elevation of the diaphragm embarrassment is obviously and cardiac an unsound procedure. We do not use the electric cradle in the circulatory emergencies of typhoid fever as, in the opinion of Fishberg (1937), it would neutralize an important defensive mechanism: besides, further sweating and loss of fluid is undesirable. Nor do we use continuous warmed oxygen unless the lungs indicate the necessity for it. The grey cyanosis arising peripherally in these cases is no sort of indication for oxygen therapy.

#### Summary

1. Clinically, circulatory collapse in severe typhoid fever is a dual failure, characterized by outspoken peripheral and occult central failure.

2. Prognosis depends largely upon the

patient's age and condition.

3. The rational treatment of this emergency

is outlined.

I am grateful to Lieut.-Colonel J. C. De, I.M.S., Principal of the Medical College and Superintendent of the Medical College Hospitals, Calcutta, for permission to publish this paper.

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was the popular method of maintaining sandflies for the purpose. The results obtained by the method advocated were sufficient to obviate the necessity for further investigation of substances other than blood on which sandflies would feed and thrive. Perhaps the name phlebotomus itself was also in some manner responsible for the impression that these insects could not live without blood, and even attempts at the artificial feeding of sandflies involved the use of blood in some form or other.

The paucity of successful transmissions in a large number of experiments led certain workers to doubt the rôle of the sandfly in the transmission of kala-azar and to investigate methods of infection other than by an insect vector. The fact that hamsters could be infected with Leishmania donovani administered by the oral route (Shortt, Craighead, Smith and Swaminath, 1928) and reports of the finding of parasites in the fæces of kala-azar patients (Shortt, Smith, D'Silva and Swaminath, 1929) as well as in the nasal and pharyngeal secretions (Forkner and Zia, 1935) was evidence in support of such an hypothesis.

Others were of opinion that a study of the bionomics of P. argentipes, of which so little is known, would most probably lead to the incrimination of this insect as the vector; for not only was the circumstantial evidence in support of the sandfly transmission of kala-azar very strong and in complete accord with our present knowledge of the epidemiology of the disease, but more especially because a few successful transmissions had already been obtained by the

bites of these flies.

Till 1934 therefore when the last series of transmission experiments were concluded, P. argentipes used for the purpose were kept alive on successive blood meals according to the method recommended by Shortt, Barraud and Craighead. The first and usually the second feed also was given on a kala-azar patient in order to infect the flies, and the third and subsequent feeds were on experimental animals. It was assumed that not till the flies were ready for a third feed, which was about six or seven days after the first blood meal, were flagellates present in sufficient numbers at the 'anterior station' to be inoculated into a victim at the bite of the fly.

It was reported by Smith (1936) that P. argentipes could be maintained successfully under laboratory conditions, either before or after a blood meal, for relatively long periods if they were fed on a five per cent solution of glucose. A serious disadvantage attendant on the method employed in feeding the flies on glucose was the rapidity with which bacteria grew in the glucose solution and infected the flies. Bacterial infections either killed the flies themselves or caused the death of the flagellates contained in their midguts. The method was therefore unsuited for keeping sandflies for

transmission experiments.

<sup>\*</sup>This work is being reported more fully in papers that will appear in the next number of the Indian Journal of Medical Research.

When research on the problem of transmission of kala-azar was renewed this year the possibility of feeding P. argentipes on food other than blood was again investigated, and it was found that these insects could be kept alive for quite long periods by feeding them on raisins, in much the same manner as mosquitoes.

The method employed was as follows:-

Method of feeding flies .- On the third day after a blood meal on a kala-azar patient the flies are placed in a globular lamp chimney, which is closed at one end with a piece of muslin and plugged at the other with cotton-wool. In the centre of the cotton-wool plug is inserted a specimen tube, about three-quarters to seveneighths of an inch in diameter, filled almost to the top with cotton-wool, with a shallow cavity to contain the raisins. The rim of the tube was adjusted very slightly above the wool of the plug. The raisins were prepared by washing them in running water for about half an hour and then scalding in boiling water for a minute. Before the flies are introduced into the chimney so prepared, the cotton-wool plug is moistened at the periphery only. Quite a large proportion of the flies oviposit on the moistened portion of the plug and, so long as they are kept without a blood meal, no further development of ova

The raisins require to be changed every day as the temperature and humidity at which it is necessary to keep these flies cause a rapid growth of moulds on the raisins in a little over

24 hours and sometimes in less.

Instead of the chimney a small muslin cage has been found to be as suitable or better for housing the flies, as the survival rate has very often been found to be greater in cages than in chimneys at the end of a ten-day period; but we have reason to believe that flagellate infections develop better in flies kept in chimneys, probably because a more constant humidity is

obtained in a chimney than in a muslin cage.

In the transmission experiments now being conducted the flies are kept until the tenth day, in the manner described above, before they are offered a second blood meal on an experimental animal. Flies at this age are the equivalent of 4th- or 5th-feed flies kept according to the old method of successive blood meals, and flagellate infections may be assumed to be well advanced. Flies which refuse to feed on one day are replaced in a chimney for a further 24 hours, when many of them are found to be ready to feed. This procedure is followed till the batch is exhausted.

Intensity of flagellate infections.—The method employed in the previous experiments aimed at keeping P. argentipes as nearly under natural conditions in the matter of food, temperature, and humidity, as was possible in a laboratory, on the assumption that by such means would the best results be obtained. The change therefore to the present method of feeding the flies

satisfactory results; flagellate infections however have been found to develop uninterruptedly in the flies and it may safely be claimed that a larger proportion of flies are found with heavy infections by this method than was seen when they were kept on successive blood meals. It is not possible to produce any figures in support of this contention as no record of the intensity of infections in flies was kept previously and it was not possible to maintain a parallel series on blood meals on this occasion. However, the senior author, who has dissected very large numbers of sandflies fed on repeated blood meals in past experimental work, and has also dissected all the flies in this series is of the opinion that in this series the infections are infinitely heavier.

Whether sandflies take any food other than blood under natural conditions is not known, but the fact that P. argentipes are most prevalent under rural conditions where there are greater opportunities for imbibing fruit and plant juices, practically throughout the year, is in favour of such a possibility.

Infectivity of flagellates .- A test of the infectivity of flagellates from sandflies fed on raisins has been made by inoculating mice both intraperitoneally and subcutaneously with such flagellates. It is hoped to sacrifice these animals in the near future, and the rate and intensity of infection in them will serve as an indication of the results to be expected from the feeding experiments with the flies.

Blocked flies'.—Infected flies that had been fed in the interval by the method described above were on the tenth day given an opportunity to feed on an uninfected animal, by a method that has been used for many years in these experiments, namely, by inverting a testtube containing one or more flies over the shaved abdomen of the animal. The laboratory attendant holds the tube in position and can observe the whole procedure. A laboratory attendant who had had considerable previous experience noted that certain flies, after puncturing the skin of the animal, were making persistent but futile efforts to obtain a blood meal. As this phenomenon was new to the senior writer also, we decided to investigate it further.

The separation and examination of flies reported to have made persistent efforts to obtain a blood meal without succeeding in doing so, revealed the fact that they were almost in variably heavily infected individuals. flies were dissected and in certain instances when the head capsules of some of them had been successfully removed it was seen that the proventricular fold was almost completely obliter ated and the esophagus greatly distended with flagellates; on more than one occasion also when recently-dead flies were dissected, flagely lates were seen escaping from the anterior end of the pharynx when its attachment to the may seem unnatural and unlikely to yield buccal cavity was severed. These features is lat exa the

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have however also been observed in the dissection of flies that showed no signs of obstruction, but not to such a marked extent.

The condition was therefore regarded as one of 'blocking' and similar to that occurring in fleas infected with Pasteurella pestis.

'Blocking' in sandflies may be partial or

complete. In the partially blocked flies a very small quantity of blood may be seen with the naked eye, but more often the aid of a lens is required to detect this minute quantity seen as a pink discoloration across the thorax of the fly. No blood can be seen in the abdomen. In the completely blocked fly no evidence of blood can be detected with a lens and in such flies no blood is seen in the midgut at dissection.

During August and September, 58 flies were labelled 'blocked' and separated for special examination. The dissection of these flies as

they died gave the following results :-

.. 49 Heavily infected with flagellates Negative, no flagellates seen Fly decomposed, no result possible ...

Once a fly is 'blocked' it is unable to feed again, though when given further opportunities it makes attempts to do so. However, amongst the flies that are placed to feed on the experimental animals on the tenth day, there are both infected and uninfected that take a full meal; these flies are given further 'transmitting' feeds

when the previous meal is digested.

The condition of blocking has been observed only among the flies being offered a second blood meal, and not amongst those which are being given third, fourth and subsequent feeds, although among them heavily infected individuals have been found on dissection. If blocking was the result of a progressive multiplication of flagellates exclusively, it should have been encountered oftener (or at least in a few instances) in flies at the fourth or fifth feed, as they had had from two to six days longer for the flagellates to develop. That this is not the case is suggestive that some, at present unknown, factor is necessary in addition to a heavy flagellate infection to produce the phenomenon, or that some factor which prevents blocking is in operation when sandflies are fed on successive blood meals.

The inability of the flies to obtain blood after piercing the skin of an animal is, we think, due to the enormous number of flagellates in the esophagus rather than in the pharynx or anterior end of the midgut, as described by Shortt, Barraud and Craighead (1926) in a fly of which

they cut sections.
Significance of 'blocked' flies.—It is suggested that blocked flies are more likely to transmit infection than the ordinarily infected fly, as in their vigorous attempts to satisfy their hunger they are likely to cause the detachment of flagel-lates from the 'block' which would easily find their way from thence into the wound; more

(Continued at foot of next column)

THE VENOM OF INDIAN COBRA (NAJA NAJA) IN CERTAIN PAINFUL CONDI-TIONS

By R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S. (Retd.)

and

J. S. CHOWHAN, M.B., B.B. CAPTAIN, A.I.R.O. School of Tropical Medicine, Calcutta

During the past few years a great deal of interest has been taken in the use of snake venoms in medical treatment. The results obtained in a series of cases treated in the Carmichael Hospital and School of Tropical Medicine, Calcutta, have been reported previously by the present authors (Chopra and Chowhan, 1937). Since then, the opportunity for treating a large number of patients suffering from pains of varying origin has arisen and, out of these, 65 representative cases have been selected and discussed in this paper.

Snake venoms have been shown to consist of a number of active principles responsible for their clinical effects. The neurotoxin principle, though present in all snake venoms, has been shown to preponderate in the venom of the Indian cobra. This toxin has a selective action on nerve tissue and is responsible for the various clinical uses for which cobra venom is advocated. Micheel and Jung (1936) separated the neurotoxin from cobra venom by ultra filtration and passage through a cellophane thimble, and precipitation. Neurotoxin, in the opinion of these authors, appears to be akin to proteins,

although its molecular weight was estimated to be as low as 2,500 to 4,000.

Ganguly and Malkana (1936) reported that all the venoms are compounds of the elements, carbon, hydrogen, nitrogen, sulphur and oxygen

#### (Continued from previous column)

transmission may thus be expected from blocked' flies than from others which, though heavily infected, do not exhibit this particular phenomenon.

In conclusion we take this opportunity to express our thanks to Mr. J. A. Dey for draw-

ing our attention to this condition.

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in addition to phosphorus. The protein constituent of the venoms consists of albumin and globulin as coagulable proteins, and primary and secondary proteoses as incoagulable proteins. The different fractions of proteins can be separated by saturation with ammonium sulphate and represent the total proteins and contain the full toxicity as gauged by the effect on pigeons by the method used for testing neurotoxins. Tetsch and Wolff (1936) undertook chemical analysis and biological tests of different snake venoms. According to these authors the chemical composition of these venoms is as follows:—

Table I
Chemical analysis of different types of venom

		Pero	CENTA	GE			
Name of venoms	Nitrogen	Carbon	Hydrogen	Sulphur	Toxicity per gram of mice		
Bee venoms  Crotalus terrificus  Cobra (species?)	13.6 14.7 14.7	43.6 44.9 45.2	7.1 6.6 7.0	2.6 3.6 5.5	6–10 mg 0.7 ,, 0.12 ,,		

A perusal of these figures will show that cobra venom is the most toxic and probably its toxicity is dependent upon its high sulphur content. Since neurotoxin is the chief active element in cobra venom it is probable that the therapeutic effects of neurotoxin may be due to its sulphur content. Ghosh, De and Bhattacharjee (1937) have succeeded in separating neurotoxin from cobra and Russell's viper venoms in a purified state and have been able to concentrate it to about 10 to 15 times of its potency in the venom. This purification and concentration of neurotoxin of cobra venom has a very important bearing on the preparation of cobra venom for therapeutic purposes. It is now possible to use neurotoxin in various nerve and other complaints in place of colloidal solution of crude cobra venom which is being used at present. It however remains to be decided if purified neurotoxin or cobra venom, as it exists in nature, is the more effective of the two.

Oh (1936) tested the action of Formosan snake venoms on the motor and sensory nerve endings and on the pain centre. For the former he used Santessou-Osaki method with frogs as experimental animals and for its effect on the pain centre he employed the Okushima method of injecting the venom subcutaneously in the back of mice and testing the pain responses by pricks on the tail. This author observed that the venom of T. gramineus and Naja atra paralysed the sensory nerve endings of the frog more rapidly than the venoms of T. mucro

squamatus, Ancistrodon acutus and Bungarus multicinctus. In the case of paralysis of motor nerve endings, Naja atra had the most rapid action compared with other venoms. The pain centre in mice is markedly depressed with 0.000,1 mg. and obviously with 0.000,05 mg. of venom of Naja atra per gramme weight of mouse and markedly with 0.003 mg., and distinctly with 0.000,5 mg. of B. multicinctus venom per gramme body-weight of mouse. Kellaway (1937) reported that all the Australian snake venoms along with the Indian cobra have a paralysant action in vitro on the sensory nerve endings in frogs (Hyla aurea) though this action was less powerful than on the motor nerve endings. Cicardo (1935) reported that cobra venom increases the rheobase and chronaxie of the motor nerves before curarization. Muscle chronaxie may also be increased. The changes in sensory nerves may take place before those in the peripheral motor nerves. Macht (1935) demonstrated the analgesic effect of cobra venom in man and guinea-pigs. After subcutaneous and intramuscular injections, the susceptibility to pain caused by an electric current was greatly diminished and lasted for several hours. This author (Macht, 1938) further summarizes his various observations on the action of cobra venom on the nervous system. He believes that, in therapeutic doses, cobra venom affects neither the sensory nor the motor nerve endings nor the ascending nor descending fibres of the peripheral nervous system. The analgesia produced is central in origin and closely resembles that produced by morphine. In experiments on normal human beings, injections of cobra venom either markedly increased the resistance to pain or heightened the sensory threshold. In experiments on mice, rats, and guinea-pigs, it was found that cobra venom injections antagonized the action of certain convulsant drugs, such as camphor, metrazol and picrotoxin. This anticonvulsant and analgesic action of cobra venom led to the discovery of its usefulness in paralysis agitans and Parkinsonian syndrome. Fabbri (1938) also believes that the action of cobra venom is through the central nervous system. He treated 25 cases of sciatica, polyneuritis, lumbago, intercostal neuralgia, trigeminal neuralgia and the gastric crisis of loco-motor ataxia. The initial dose in every case was 0.04 mg. injected intramuscularly and repeated 2 to 3 times a week. The relief usually followed after the fifth or sixth dose. Some of these cases who, previous to this treatment, required large doses of morphine to suppress their pain, were now free from their symptoms. Occasionally local swelling, pain, redness and pyrexia occurred at the site of injection. Local reactions such as skin eruptions and glandular enlargements lasted for one to two days after the injection. These symptoms usually appeared after such a large dose as 0.1 mg. and could be avoided by deep intramuscular injections. Laignel-Lavastine, Koressios Warmser and

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ould be ections. oressios is on the peripheral vasomotor nerves. Calmette has shown that cobra venom has a special affinity for phosphatic elements, especially lecithin of nerve cells, producing a compound which suppresses the sensibility to pain without, however, interfering with the conductivity of motor nerves.

(1934) believe that the action of cobra venom

Recently evidence has been advanced to show that most if not all motor nerves, on stimulation, liberate acetylcholine at their endings and that this substance and not the nerve itself carries the impulse across the synapse to the endorgans. This acetylcholine is rapidly destroyed in the blood by the presence of a specific choline estrase in the plasma. If, therefore, acetylcholine is prevented from reaching the receptor endorgan by its destruction through choline estrase, apparently the impulse will not pass across the end-organs to the responsive tissues. Iyengar, Sehra, Mukerji and Chopra (1938) reported the presence of appreciable amounts of estrase in cobra venom itself. This finding offers a new and plausible explanation regarding the painrelieving property of cobra venom. Choline estrase in cobra venom will supplement the activity of choline estrase in blood, will help in destroying the acetylcholine at the terminal ends of these nerves and will thus prevent the transmission of impulses from the nerves to the tissues and vice versa. It will in this way cut off the extraordinary and exaggerated sensation or impulses passing between the nerve and the

#### Cobra venom in different types of pain

Kirschen (1936) reported on the analgesic action of cobra venom in neuritis in man and also in spontaneous and transplanted carcinoma in mice. The pain was reduced with small doses. In cases where the improvement was felt, the same dose was repeated, and the interval of injection was lengthened. The dose was increased if no improvement followed after the fourth or fifth injection. He concluded that though cobra venom has no specific effect in carcinoma in man, it has, however, a decided analgesic effect which is of great significance. He treated seven cases of neuritis of which two were severe sciatica. He used a colloidal solution of standardized cobra venom, free from bacteria, hæmorrhagins and hæmolysins, supplied by the Dumatras Laboratory of Paris.

Brünner-Ornstein (1937) recorded gratifying results in obstinate cases of trigeminal neuralgia; relief was speedily obtained in half an hour. Of the 14 cases of severe neuralgia, six had been suffering from pain for three to four months and were considerably relieved after the treatment. In a few cases he used Crotaline venom, but this venom did not give encouraging results. Burgess Barnett in a personal communication informed him that he had obtained excellent results in tabetic crises.

Rottmann (1937) reported on 10 cases of tabes from Vienna university clinics all of whom improved remarkably after treatment. He used cobra venom (species not mentioned) in 5 c.cm. ampoules containing 200 mouse units. Starting with 10 mouse units as an initial dose he increased it by 25 and 30 units at intervals of 7 to 10 days and went up to 60 mouse units. He believes that the good results obtained were due to its action on the specific granulation processes. He is also of opinion that the venom is not of much use in meralgia paræsthetica, amputation neuralgia, and herpes zoster, though it has been found beneficial in cases of herpes simplex. Bullrich (1937) obtained good results in six cases of angina pectoris, and arteriosclerosis with attacks of angina, syphilitic aortitis with aortic insufficiency due to coronary sclerosis. Intravenous injections were given every third day, beginning with a dose of 0.25 c.cm. followed by 0.5, 0.75 and 1 c.cm. The number of injections depended upon the severity of the case and the reaction produced. The preparation corresponded to the standard of Calmette and Taguet, 0.1 mg. representing 5 m.u. Seiler (1936) used cobra venom in cases of severe sciatica and pains in the legs due to arterio-sclerosis, bronchial carcinoma and cancer of the prostate with pain in the legs. He entirely failed to confirm the claims made by other workers on the efficacy of cobra venom as an analgesic, and added that this failure might be due to impurity of the venom used by him.

#### THE PREPARATION AND USES OF COBRA VENOM

Injectable venom, as prepared by the present authors in the School of Tropical Medicine, is a colloidal solution of fresh venom of the Indian cobra (Naja naja) obtained through the courtesy of the Director of the Haffkine Institute, Bombay. The solution was prepared by dissolving the venom in sterilized normal saline solution in concentration of 1-10,000, 0.25 per cent of carbolic acid being added. Its sterility was tested for types of bacteria and particularly those of gas gangrene and tetanus groups. The solution was packed in 10 c.cm. rubber-capped vaccine bottles and stored in refrigerators. The preparation was standardized in strength of 10 mouse units (m.u.) per c.cm. It was observed that after stocking it for a few months, a thick flaky deposit settled at the bottom of the containers. The supernatant fluid was tested again for sterility and toxicity. It was shown that the venom solution after stocking for six to tenmonths still represented about eight mouse units per c.cm., and was free from bacterial contamination. Bagnasco, Aguilar and Garzoli (1938) reported that the cobra venom solution used by them for therapeutic purposes deteriorated after 6 to 8 months.

Contra-indications.—Before starting cobra venom injections the conditions of the excretory organs should be carefully investigated. Bagnasco and his associates (1938) observed that the patients with cardiac disturbances, aortitis, cardiac insufficiency, etc., did not give satisfactory response. Patients failing to improve after 2 to 3 injections were regarded by them as refractory cases. The treatment, in their opinion, is incompatible with administration of iodine, gold and silver salts and radioactive substances.

The present authors have observed remarkable sensitiveness in a few cases only. The symptoms as observed by Taguet and Monaelsser were sleepiness, restlessness, acute inflammation at the site of injection, respiratory difficulty, nausea, diarrhea or vomiting, and palpitations. Such marked symptoms were not seen by the present authors. Local sensitiveness in the form of redness and swelling at the site of injection and sometimes even blistering were observed, the latter condition occurring usually with Russell's viper venom injections. In some cases the original symptoms were temporarily exaggerated after the injection of cobra venom, but this was regarded as a symptom of reaction. The present authors as a rule started with a very small initial dose, particularly in the case of women, children and debilitated patients, such as those suffering from cachexia of malignant disease. In such cases one-tenth of a mouse unit was the first dose. Later the dose was increased, with due regard to the response given by the patient. Resistant cases, or cases which showed no improvement with 4 to 6 doses, were given vitamin B, with good results.

Cobra venom has been extensively used by the authors in all types of pain. Gass (1938) and Chowhan and Chopra (1938) reported on the use of cobra venom in pains of nerve leprosy. The series of cases discussed in this paper were in-patients both in the Carmichæl Hospital for Tropical Diseases and in the out-patient department of the Calcutta School of Tropical Medicine (see table IV). Usually the injections were given intramuscularly, twice or thrice weekly, in doses ranging from one to twenty mouse units. In some cases, where prolonged treatment was required or ordinary doses did no good, strong solutions containing a hundred mouse units per c.cm. were given by the intradermic route. In some cases, vitamin B<sub>1</sub> was also given in addition to cobra venom. The cases are grouped as:—

- (a) Those who showed marked improvement, and were for all practical purposes cured and free from their complaints.
- (b) Those in whom relief of symptoms was definitely evident, and according to the patients' own version 50 per cent of the complaints were relieved.
- (c) Those in whom the benefit was slight, doubtful or nil.

The patients treated in the hospital were first thoroughly investigated in order to find out the

cause of the pains. Their diseases can be grouped as follows:—

#### TABLE II

Neuritis, neuralgia, diabetic neuritis, post- filarial neuritis, etc Sciatica Lumbago and fibromyositis Osteochondroma and arthritis Paræsthesia Nerve leprosy	26 13 4 8 1 2	Orchitis and funiculitis Cerebral diplegia Paraplegia Progressive muscular atrophy and tabes dorsalis Habit spasms Chronic headache Trigeminal neuralgia with tic	2 2 3 1 1 1
		TOTAL	65

The total number of cases treated and the percentage in each group are shown in table III.

#### TABLE III

Effect of cobra venom treatment on patients grouped according to the degree of relief obtained

	Number of cases	Percentage
(A) Marked relief (B) Definite relief (C) Slight relief (D) Doubtful or no relief	23 23 9 10	35.4 35.4 13.80 15.40
Total	65	

In order to economize in space, only representative cases in each group are quoted (table IV).

It will be seen that out of 65 patients 35.4 per cent were reported to have been cured or to have had marked relief. In these cases 5 to 15 injections of cobra venom were administered. The maximum dose of the venom reached was 20 m.u. Usually the initial relief was reported

after the third or fourth injection.

In two cases injections of vitamin B<sub>1</sub>, or novalgin, were given. The relief was accelerated by addition of vitamin B<sub>1</sub> to cobra venom therapy. Stevenson (1938) has already reported that vitamin B<sub>1</sub> is very useful in neuritis. He used it empirically and found that, of cases of sciatica and neuritis, about 33 per cent were almost cured. In another 35.4 per cent there was also definite relief (i.e., in about 50 per cent there was relief of symptoms). Taking both these batches together it is observed that about 70 per cent of patients are markedly relieved of their symptoms.

Intradermal injections were tried in cases where doses of more than 20 m.u. were to be used. This method seemed to possess no particular advantage over the intramuscular route: In 13.8 per cent there was only slight relief and usually prolonged treatment was required; most of these cases were suffering Collection Hardwar.

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Different types of painful conditions treated with injections of cobra venom

Numbe			e, caste	Symptoms	Diagnosis	Present treatment (mouse units)	Effect
A.*	1	35,	Н., М.	Pain left side of head, neck, arm and shoulder six years, tremors of tongue, neck and hands.	Progressive muscular atrophy.	5, 6, 8, 10, 12, 10, 12.	No pain, slight ting- ling left arm.
	2	49,	Е., М.	Pain left chest, left shoulder, arm, 1st and 2nd fingers. Numbness in finger tips and finger nails. One year.	Brachial neuralgia	2, 4, 6, 8, 10	No more pain, feels much better.
	3	21,	Н., М.	Pain in lumbosacral region constant and dragging in type, duration two years. X-ray examination showed a growth of the ischial tuberosity.	Osteochondroma of ischial tuberosity.	2, 4, 6, 6, 8, 9, 10, 10, 10, 10, 10— two months later 50, 70 due to recurrence of pain.	No pain after 12 in- jections, two months later slight pain re- lieved by two large injections. Has not been seen again.
	4	46,	Е., М.	Vague pain in thoracic spine, not elicited by tapping on the head or the spine. Pain in calf muscles, headache and burning sensation in skin and the trunk, shifting in character, hyperæsthesia left calf and foot, less on the right side.		1, 2, 4, 4, 5, 5, 8,	Ninety per cent relief. No report for two years.
	5	25,	E., M.	Spasmodic attacks of pain in the sternomastoid for 1½ years, six months ago tem- poro-mandibular joint stiff, filariasis in 1930.	arthralgia.	1, 2, 3, 4, 6, 8, 8, 8, 10, 10, 10.	Marked relief.
	6	60,	AI., F.	Hemicrania left side three years; pain left side of body one year, at present pain in right thigh shooting down- wards and vague pain all over the body and left knee.	and teno-synovitis.	2, 4; 6, 8, 8, 4	No more pain.
	7			Epidemic dropsy 1½ years Pain hips, shoulders and scapular region on both sides, tremors of hands and arms of paralysis agitans type.	epidemic dropsy and Parkinsonian syndrome.		return of pain.
B.*	١ 1	30,	Н., М	Tingling sensation, urticaria hands and feet. Epidemic dropsy one year.	Neuritis and urticaria.	2, 4, 4, 6, 8, 8, 10, 15 (intra- dermal injec- tions).	Definite relief.
	2	30,	Н., М	Paraplegia six months, started as pain in thoracic region radiating downwards followed by paralysis of both legs.		2, 4, 6, 8, 10	Definite relief.
	;	3 40,	Н., М	Severe pain along the left limb for three years, worse for three months.	Sciatica	3, 5, 6, 8, 10, 10, 10, 10, 10, 8, 10.	Definite relief.
	4	33,	Н., М	Pain in testicles and spermaticord and pulling sensation in scrotum 15 years. Hydrocele operated on a year ago; no improvement, impotent.	culitis.	2, 4, 6, 8, 10, 10, 10 (vitamin B <sub>1</sub> and C injections along with cobra venom 10, 10, 10).	
		40,	H., M	Hard immovable growth lefthigh 3" × 7" × 2½", hard and smooth; pain constant severe at night, duration two years. Pain radiate downwards.		0.75, 0.75, 2, 4, 6	Some relief. Treatment discontinued.
	0				*See table III.		

\* See table III.

#### TABLE IV—concld.

		•	BDE 11 co.		
Num- ber	Age, caste and sex	Symptoms	Diagnosis	Present treatment (mouse units)	Effect
6	30, H., M.	Stiffness of neck muscles and back, gonorrhea 12 years ago, spermatorrhea, no pains in joints, pyorrhea alveolaris.	Fibromyositis (gonor-rhœal).	2, 2, 6, 8, 10, 10, 10, 10, 15.	Marked relief.
7	51, H., M.	Pain left thigh and legs two months, relieved when he sits. Pain worse on walking.	Sciatica	5, 7, 10, 10, 10, 10, 10, 10, 10, 10, 10.	Fifty per cent relief, did not return for further treatment.
C. 1	35, H., M.	Snake bite six months ago, neuritis two days later, no other toxic symptoms of venom.	Neuritis after snake- bite.		Slight relief.
2	20, M., M	Pain left buttock and leg and foot, tingling left foot.	Sciatica	2, 4, 6, 6, 8, 10, 10, 10, 15, 10, 20, 50, 50, 50,	Slight relief after pro- longed treatment.
D. 1	40, H., M	Pain in left buttock, radiates to left thigh and foot.	Sciatica	50, 50, 50. 1, 3, 3, 5, 7, 5, 5, 10. No relief. Advised vera-	Little or no relief.
2	18, H., M	Spastic paralysis both legs since childhood, contracture deformity upper limb.	Cerebral diplegia	mon 5, 6, 8, 10. 1, 2, 4, 6, 6, 8, 10, 10, 12.	No relief.
3	51, M., M	Pain shoulders and limbs; hands and feet, wrist bone swollen, syphilis 22 years.	Arthritis (venereal)	2, 4, 6, 8, 8, 8	No relief.
4	20, H., M	Measles February 1936, persistent headache, could not carry on his college studies. Pain is constant, sometimes so severe that he cannot open his eyes of read; fainting fits and clonic spasms.		He had Rauwolfia serpentina and bromides, no relief. 2, 4, 6, 8, 10, 10, 10.	No relief. Spasms stopped.
	5 47, H., M	I. Left trigeminal neuralgia 3½ years without any defi- nite cause. Various injections given, slight relief. Started after removal of his teeth Wassermann reaction nega- tive.		5, 8, 10, 15, vita- min B, and 15, 15, stopped.	Temporary or doubt- ful relief.

from sciatica and lumbago. In sciatica, relief is not marked since the pain may be due to pressure on the nerve, or fibrous adhesions in the sciatic notch may be constantly irritating the nerve. In 15.4 per cent of patients there was no relief at all. One patient of this group was suffering from habit spasms and the other from tic douloureux; the latter was finally shown after x-ray examination to be due to an abscess in an alveolar socket in the lower jaw. In cases of chronic headache, improvement was not marked.

Conclusion.—Cobra venom plays a definite part in relieving pain of an indefinite nature in a large number of patients. Its action is often slow, but in many cases certain and lasting. It may be used with impunity in chronic pains of nervous and muscular origin, arthritis and in inoperable malignant disease, with beneficial results. Purified neurotoxin is now being prepared for trial to determine if it is more effective than the whole cobra venom which is being used at present.

Summary.—(1) Cobra venom has been tried in various types of vague and indeterminate painful conditions.

(2) In about 70 per cent of cases there was marked and considerable relief of pain, and in about 30 per cent of the cases the relief was, doubtful or indefinite.

(3) The pain disappears slowly but the effect is lasting.

(4) No untoward symptoms were produced by the injections.

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THE TREATMENT OF CARBUNCLE: DUTT

#### THE TREATMENT OF CARBUNCLE IN THE OUT-PATIENT DEPARTMENT

#### By CHITTA RANJAN DUTT, M.B. Howrah

THE introduction of autohæmotherapy in the treatment of carbuncle has given very good results in my hands, much better than the old method of surgical treatment.

The technique consists of injection of the patient's own citrated blood, the amount depending on the area affected, usually about 10 to 20 c.cm. each time, starting about half an inch within the extreme margin of induration and injecting gradually as the needle is pushed towards the centre of the carbuncle till some blood wells out of the small openings over the carbuncle. About four lines are so treated each time. The patient gets about two to four such courses. In addition ordinary boric or saturated magnesium sulphate compress is applied to keep the part free from the foul pus discharge.

This method of treatment is usually done on patients who can be kept under control in the indoor wards or in private houses. But it can be carried out on out-patients who probably visit twice or thrice a week, and in this fact the

interest of this article lies.

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This method has been tried with very good results on many patients who consented to be treated as out-patients. After one injection the induration becomes less, the swelling localized and discharge of pus free and thin and not like thick sloughs. The pain is much less or dis-appears entirely and one can sleep well. After two or three injections the whole part becomes covered with red granulations underneath and in most cases the overlying skin is not dead. It was found that this method certainly cuts short spread of the disease and also lessens very much the period of convalescence.

Carbuncles of various sizes from 10 inches in diameter to 2 inches in diameter were treated. Carbuncles in various situations including one on the face were also taken up in the series. The results were uniformly good and there was no untoward effect because of the patients being

treated as out-patients.

Case 1.—Adult male, age 60. Carbuncle situated in the dorso-lumbar region on the right side of the spine. At his first visit on 6th July, 1937, the indurated area was 5½ by 3½ inches, there was burning sensation and the patient could not sleep at night. Temperature 99°F., pulse 88, respiration 24. Urine—sugar and albumin nil.

albumin nil.

Five injections were given, the first being performed on the day of his first visit. After the first injection pain much abated and after the second it disappeared almost completely and temperature came down to normal and pulse/respiration 80/20. After the 4th injection, slough separated completely and the skin over the area was healthy and the area of induration was reduced to 3½ by 2½ inches. Saturated magnesium sulphate compress was applied throughout the course of treatment. On 20th July only two small superficial ulcers ½ inch in diameter were left and the patient was advised to dress with unguentum borovaseline. An alkaline mixture with potassium bromide was administered throughout the course.

Case 2.—Adult male, age 52. Carbuncle situated on

tered throughout the course.

Case 2.—Adult male, age 52. Carbuncle situated on the right buttock. At his first visit on 19th August, 1937, the indurated area was 5 inches in diameter, there was severe pain and the patient had three sleepless nights. Urine—sugar and albumin nil.

Two injections of 10 c.cm. each were given. After the first injection only slight pain was felt and after the 2nd injection on 25th August the area of induration was 2 inches in diameter. Saturated magnesium sulphate compress was applied and at first potassium bromide and later mistura ferri et strychninæ 3i, t.d.s., were administered. Tiny ulcers were left after the 2nd injection, which were dressed with unguentum borovaseline.

borovaseline.

Case 3.—Adult male, age 40. Carbuncle situated over the occipital region. At his first visit on 25th September, 1937, the indurated area was 5 inches in diameter extending from external occipital protuberance to 7th cervical vertebra and from one mastoid to the other mastoid region. There was burning sensation and the patient had no sleep for last three or four nights. Urine—sugar and albumin nil.

Two injections each of 10 c.cm, were given at an

Two injections each of 10 c.cm. were given at an interval of 48 hours. After the first injection the pain markedly diminished and the patient could sleep at markedly diminished and the patient could sleep at night. Magnesium sulphate compress was used and magnesium sulphate and glycerine paste was applied over the indurated area. The patient was advised pulv. A. P. C. on the day of his first visit to relieve the pain. On 10th October two superficial ulcers each \$\frac{1}{2}\$ inch in diameter were left and the skin over the area was healthy.

Case 4.—Adult male, age 49. Carbuncle situated on the left cheek. At his first visit on 7th October, 1937, the indurated area was 2½ by 2 inches in diameter.

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There was burning sensation. No sleep at night. Urine—sugar and albumin nil.

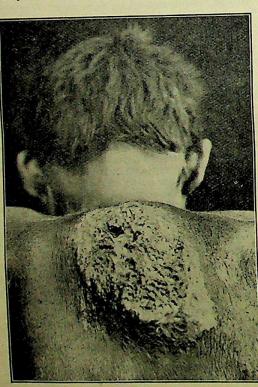
One injection of 6 c.cm. was given on 7th October and on 13th the overlying slough completely separated. Healthy granulating surface appeared. Magnesium sulphate was used as a compress throughout the course of treatment and potassium bromide mixture 3i, t.d.s., was administered. After the first injection the pain

of treatment and potassium bromide mixture 5i, t.d.s., was administered. After the first injection the pain almost completely disappeared. Subsequently the wound surface was dressed with unguentum borovaseline.

Case 5.—Adult female, age 50. Carbuncle situated on the middle of the back on the left side. At her first visit on 28th June, 1937, the indurated area was 3½ inches in diameter. The condition was sloughing and there was severe burning pain and fever. Urine—sugar and albumin vil.

sugar and albumin nil.

Four injections were given the first being performed on the day of her first visit. When she came to the outdoor after the first injection, she said that the pain had disappeared completely. When she came on the 4th day after the first injection she complained of slight pain when the 2nd injection was given. After that, she never complained of pain. Magnesium sulphate compress was applied throughout the course and potassium bromide mixture 5i, t.d.s., was administered. After the 4th injection, the slough completely separated and the ulcer considerably reduced in size. Patient went home on 13th July on her own initiative and when she again came to the outdoor on 22nd only a scar ½ inch in length was left.



Case 6.-Before treatment.

Case 6 (an indoor patient at the Howrah General Case 6 (an indoor patient at the Howrah General Hospital).—Male, age 60. Appearance on 3rd May, 1939, when the first photograph was taken. Carbuncular area 5½ inches in diameter. Not much induration around. Multiple openings covered with thick sloughs. No sleep for five nights. Urine—sugar and albumin nil. Blood sugar—112 mgm. per 100 c.cm. Ten c.cm. blood injected in the upper quadrant in three situations. Pain much diminished 24 hours after the injection and patient had a good sleep at night. Magnesium sulphate compress thrice daily. Patient could not keep his head erect.

On 9th May the necrosed area had diminished to 2 inches in diameter with complete separation of

(Continued at foot of next column)

OBSERVATIONS ON THE PATHOLOGY AND THERAPY OF THE SO-CALLED FRONTIER, SORE

> (SECOND COMMUNICATION) By H. J. HAMBURGER

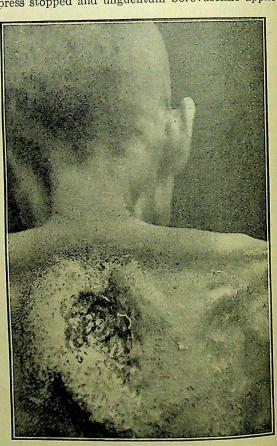
Memorial Hospital, Sialkot

Introduction.—In an earlier paper (1939) we drew certain conclusions about the clinical complex of so-called frontier sore, the chronic ulcer which is so common in N. W. India, using as material 88 cases. These conclusions were:

(1) Frontier sore is a clinical entity. Only laboratory examination reveals various ætiological groups, where history and clinical observation have failed. The ætiological groups are

(Continued from previous column)

sloughs. Twenty-four hours after that granulation appeared. Almost no pain. Major part of the skin over the peripheral part of the carbuncular area tending to become normal. When granulation appeared compress stopped and unguentum borovaseline applied.



Case 6.—After treatment.

Patient's condition was very low on admission Pulse soft; patient—anæmic; temperature—100°F, so was given an alkaline and bromide mixture. Fifty cubic centimetres of 25° was given an alkaline and bromide mixture. Fifty cubic centimetres of 25 per cent glucose intravenously twice daily. Camphor in ether 1 c.cm. four hourly was administered when pain and temperature abated. Mistura ferri et strychninæ 5i, t.d.s., given. The patient had an attack of benign tertian malaria quinine sulphate was administered. Temperature came down to normal, the local condition much improved and the patient was discharged to attend the outdoof for dressing.

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ppeared pplied. mainly characterized by Leishman-Donovan bodies, Klebs-Loeffler bacillus and, in about 89 per cent of the total, by non-specific common pyogenic organisms, mainly Staphylococcus aureus.

(2) The exact microscopic diagnosis permits specific treatment for each case according to the organism revealed. For the big group of sores with common pyogenic organisms and secondary invaders, compounds containing sulphonamide proved to be of efficacy in local application.

Subject of this study.—It was desirable to find further evidence for these conclusions. The present study is concerned with an attempt to clarify the uncertainty about the history of the frontier sore. We wanted further to confirm in another locality the previous statements, namely that the frontier sore is an affection in which mainly the common pyogenic organisms are found, and that sores which reveal Leishman-Donovan bodies form only a minor group. Further, we wanted to obtain more data about the efficacy of the local sulphonamide treatment, and to improve it if possible.

Method.—In the middle of December 1938 we were asked to examine a batch of 58 men who had returned to their station after having served in Tonk (South Waziristan) during the hot weather of 1938. They all belonged to the same unit. Twenty cases were selected for observation, who had shown no response to routine treatment. The others were asked about the duration of their disease from the beginning to the present state of relative improvement. Histories were taken in all, with special

emphasis on diet.

The 20 selected cases were examined as described in the first article. For technical reasons only a small number of bacteriological examinations could be undertaken. These, however, are representative. The examination for Leishman-Donovan bodies was done in each case. In some of them a parallel examination was carried out by the district laboratory, Peshawar, and by us in Rawalpindi. There were no differences in the two independent series of examinations.

Treatment was carried out entirely by the staff of the military hospital where the patients attended, and the results were put down in the previously mentioned forms. We re-visited the out-patient department only once seven days after treatment was begun. The data collected in the first inquiry and examination of the 56 cases, at the second intermediate inspection seven days after the beginning of treatment, and the hospital report after completed cure, is the source of the material for this study.

#### Results

History.—Differing from our previous experience, the enquiry into the history was successful. All 58 men stated that the sore, occurring after an insect bite, perhaps a mosquito, began to develop into a small boil and from that into the sore. All the men had acquired the condition

between 15th February and 15th November, 1938, when in Tonk. Out of 80 men in this unit 58 were affected. Another unit which had been at Tonk during the hot weather of 1937 had a great number of cases with long total or partial disablement. We have had the opportunity of seeing a number of these 1937 cases and are convinced that, though we could not collect exact figures, they represented the same affection. In a group of men of the same unit, who had been stationed at Tonk between 25th December, 1937 and 15th February, 1938, only one case occurred who did not develop these scres until November, and he had been out of the station. A further group, which was stationed during the hot weather of 1938 at Bannu (not far from Tonk), had only one case of frontier sore.

Duration.—The duration of the disease under routine treatment, that is, with simple ointment, acriflavin dressings, hot fomentations, scraping or occasionally emetine injections, varied between 3 weeks and 8 months, the average being 4½ months. The duration of the 20 cases, who came subsequently under closer examination and treatment, varied between 1½ and 5 months, the average being 3¼ months. This indicates once more the extreme chronicity of the frontier sore and the unsatisfactory state of routine treatment now employed.

Diet.—The food which the affected men received was mixed and varied. There was no evidence of any possible food deficiency. The men were given fresh onions two or three times a week while in Tonk. Meat however had not been available, but was eaten by all in the home station since their return. The use of meat had apparently no influence upon the occurrence of the sores or their reluctance to heal.

Clinical aspect.—The healed or almost healed cases show a flat, sometimes depressed, scar. It is frequently depigmented, always soft and indolent. Sometimes a cover of few dry scales is found. Frequently atrophy of the skin is noticed.

The clinical picture of the twenty cases who came subsequently under treatment was as follows: - The sores, single as well as multiple, were situated on the extremities, except for two on back and face. Knees, ankles, elbows, forearm and back of hand are the commonest sites of the condition. In more than half of the cases this type of ulcer, with or without a scab, was found; in the rest of the cases we found an infiltration and hardness, with only small skin destruction through which a little discharge penetrated, which was only in one case purulent. Cyanosis, atrophy, cedema, dry scales are frequently met with. A peculiarity of this batch of sores was that in eight cases small papules were noticed in the circumference of the ulcer, or they extended over the entire infiltrated area, giving the impression of a lupus-like affection. It has been found that similar papules occur round leishmania sores after their injection with

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berberine sulphate, or even without that-after prolonged ointment treatment.

It might be just the expression of a nonspecific reaction of the skin to repeated irrita-

tion. Etiology.—Not one of the cases revealed Leishman-Donovan bodies. Six cases were bacteriologically examined. Smears from the surface were taken as well as serum from the indurated base or border of the ulcer, and inoculated on Loeffler medium. Three of the cultures were sterile, in all of which the sores were 'closed'. The 3 others gave a spore-bearing organism of the Subtilis group, Staphylococcus aureus and a diphtheroid, all of which seem to be secondary invaders. The finding of 3 different organisms along with the same clinical picture and equal response to treatment allows the conclusion that this frontier sore is a nonbacterial infection which must be carried by insects. The findings reported in our first paper fit into this conclusion.

Treatment.—For the treatment 20 cases were divided into 3 groups :-

Treatment	Number of patients	Number of applications needed, daily or every other day	Remarks
Four applications of AS <sub>3</sub> ointment, thereafter 5 per cent prontosil ointment.	10	8	AS <sub>3</sub> was not proving very effective, hence changed to prontosil, all cured.
Five per cent prontosil ointment.	5	6	All but one cured, who improved after ten applications.
Five per cent prontosil ointment + prontosil rubrum gr. $7\frac{1}{2}$ , $t.d.s$ .	5	8	All cured. In one case oral treatment was given up, as leucocytes decreased in differential counts from 64 to 48 per cent.

AS<sub>3</sub>, the exact chemical formula of which is not known to us, is according to the manufacturers a compound of the diseptal series, closely related to uleron. Messrs. Bayer inform us that it has given particularly good results in laboratory experiments against virus diseases. Its efficacy has, however, in our particular application been disappointing, as compared with the next treatment.

The 5 per cent ointment with prontosil rubrum or prontosil base (4-sulphonamide-2' 4'-diamino-azobenzol) showed the best results and proved to be an effective and economical treatment for this type of frontier sore. An outstanding case may be given, as representative

of the many dramatic cures we have seen with this treatment :-

Case. A follower (water carrier), about 45 years. Total duration four months under routine treatment. General health good. Over lower third of the left tibia, 2:2 inches large deep weeping ulcer. At the bottom a few unhealthy granulations. Surrounding skin showed atrophy of dermis.

After four applications of prontosil ointment 5 per cent the ulcer flattened out and became shallow, with no weeping, but healthy granulations in the centre, meanwhile the outer edges were covered with epithelium which grew towards the centre. After six applications complete cure.

The combined oral and local treatment has not shown itself superior to the local treatment alone. The latter has the advantage of being easier, as no control of the blood picture, mainly

of the leucocytes, is necessary.

The local application of prontosil is commanding more and more interest. Besides the publications dealing with the local uses of these drugs mentioned in our previous article, we have found now further reports about this method of applying sulphonamide compounds. Recknagel (1935) applied prontosil in big abscesses, locally. Tilling (1936) and Brown (1937) report that empyemas heal rapidly if after aspirating pus from the cavity 5 c.cm. of 2.5 per cent prontosil is instilled. There are reports about the value of prontosil and related compounds in septic throats and urinary, mainly gonorrheeal, infections, locally employed. The Deutsche Medizinische Wochenschrift of 21st January, 1938, gives a general survey of the many local uses of

The present communication may contribute to indicate the amazing wide range of usefulness

of sulphonamides in fighting infections.

#### Summary

(1) The so-called frontier sore is not a leishmanial infection. There is a certain amount of evidence available that it is a non-bacterial disease carried by an insect.

(2) Prontosil rubrum has again shown itself in local application to be effective. It is

superior to AS<sub>3</sub>, a diseptal compound.

#### Acknowledgments

We are indebted to Colonel F. F. Strother Smith, I.M.S., for offering the opportunity to collect ætiological and therapeutical data on patients; to Major King, R.A.M.C., and Captain Bassalvi, I.M.S., for their interest and help in the clinical work; and to Major Phease for making the bacteriological data available for

To Dr. O. Urchs from Bayer Remedies, Bombay, we owe thanks for the generous supply of prontosil, prontosil ointment, and AS<sub>3</sub>.

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#### AORTALGIA OR ANGINAL PAIN OF AORTIC ORIGIN

By RUSTOM J. VAKIL, M.D. (Lond.), M.R.C.P. (Lond.), D.T.M. & H. (Lond.), F.R.F.P.S.G.

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The syndrome of 'aortalgia' was brought to the attention of the medical profession, for the first time, by Ortner; he mentioned a few points of distinction between true angina pectoris (Heberden's angina) and aortalgia and considered the two conditions ætiologically and clinically distinct. While regarding angina pectoris as a disease of the coronary arteries and nerves, he attributed aortalgia to an affection of the aortic walls. This view was upheld by Frank and Worms (1926) of Berlin.

Whereas angina pectoris has been recognized for a hundred and fifty years, aortalgia is a new-comer into the field of cardiology. Because of its comparative rarity and the scant attention paid to it by the medical profession, especially in the English-speaking countries, many clinicians are unaware of its very existence.

The following cases of anginal pain, which conform to the clinical description of aortalgia, are sufficiently unusual to warrant publication:

Case 1.—A Parsee of about seventy years of age was seen, last year, complaining of difficulty in writing and walking, attacks of giddiness and pains in the chest. The symptoms were progressive and had been noted for about two years.

The pains were anginal in character, in that they came on after exertion, were relieved by rest and nitrites, were confined to the sub-sternal region, and had a tendency to radiate to the left shoulder and elbow. The pains, however, used to last for as long as ten to twenty minutes and were followed by sensations of tingling and numbness in the left upper extremity, for a period of two or more hours. Stroking the surface of the skin with a pointed match-stick revealed areas of hyperalgesia in the left axilla and in the interscapular region at the back.

Fluoroscopy showed an 'unfolded aortic arch' with considerable calcification of its walls. The radial and popliteal arteries were tortuous, hard and calcified. The blood pressure was 108/67.

The patient was given a course of Entodon injections in an attempt to prevent further atheroma. He was then put on a mixture containing potassium iodide and nitrites and was asked to report periodically, but has not as yet done so.

Case 2.—A Parsee male, aged 69, was examined in November 1939. He complained of attacks of shortness of breath and oppression across the upper part of the chest, at the level of the angle of Louis, on walking or climbing stairs; these attacks, which occasionally come on after a heavy meal or a hot bath, compel him to 'stop at once' or lie down. They were first noticed about the middle of 1937; they are getting more frequent and are easily induced. The pain, which lasts twelve to fifteen minutes, is seldom severe; it is accompanied by a dragging sensation or 'tense feeling' in the chest, shoulder and upper arms; at times, this sensation is confined to one arm and shoulder only (left or right); there is usually a feeling of soreness in the left axilla during the attacks.

There is nothing of note in the patient's past medical or family history

On examination.—He is a short stout individual of the plethoric type and very energetic. He is obviously worried about his condition. The pulse is regular

except for an occasional extra-systole. The systolic blood pressure varies from 120 to 140 and the diastolic from 80 to 95 mm. Hg.

The size of the heart is normal; no murmurs are audible and the aortic second sound is loud and ringing in character.

The electrocardiogram shows some degree of left ventricular hypertrophy. Fluoroscopy shows a dilated aorta (transverse diameter: 7.6 cm.) with a moderate degree of calcification of its walls.

The patient, who is under observation at the present time, is on a mixture containing potassium iodide and sodium nitrite.

Case 3.—An Englishman, aged 55, was seen in 1937 in Liverpool. He complained of giddiness and attacks of sub-sternal pain on exertion, each attack lasting for about a quarter of an hour. The pain, which was associated with feelings of tingling, used to spread to both shoulders. The attacks of pain were attended by discomfort in the left axilla with tenderness lasting for several hours after the actual attacks. The pains were located high up behind the sternum and responded but slowly to rest and nitrites.

The man was found to have a rough systolic murmur in the aortic area, an apex beat slightly displaced to the left, a normal blood pressure and a positive Wassermann reaction. A diagnosis of 'syphilitic aortitis with angina' was made. The electrocardiograms showed right bundle-branch block.

Cases of similar nature had also been observed at the Liverpool Heart Hospital, but the case reports of these are, unfortunately, not available. In some of the cases a coexistence of both types of anginal pain (viz, Heberden's angina and aortalgia) was noted.

Case 4.—L. S., a Hindu male, married, aged 55, gave a three months' history of breathlessness on exertion, insomnia and cough with expectoration. The symptoms started soon after a febrile attack.

started soon after a febrile attack.

The pulse rate was 85 per minute, and the blood pressure 210/140. The urine contained albumin but no casts. There was some ædema of the ankles, the neck veins were congested and pulsating and the liver edge was palpable and tender.

For some time, he had experienced severe sub-sternal pains on exertion or walking, and lasting for fifteen to twenty minutes; they would start behind the upper half of the sternum and would radiate to the left shoulder alone or to both shoulders, but never below the level of the elbows. The attacks of pain were succeeded by tenderness and cutaneous hyperalgesia, lasting as long as twenty-four hours, over the entire length of the sternum, in the left inter-scapular region and over the brachial plexus in the left axilla. These regions would remain hyperæsthetic to painful stimuli for hours after each attack of pain.

The patient was considerably benefited by rest in

The patient was considerably benefited by rest in bed and a sedative mixture for some weeks; when last seen in October 1939, he was free from pain and his blood pressure was 180/120.

#### Discussion

Diagnosis.—At first sight, there appears to be little or no dissimilarity between cases of true angina pectoris and aortalgia. They both have sub-sternal pains with a tendency to radiate into the arms; closer scrutiny, however, reveals differences between the two types of pain, sufficiently characteristic to permit differential diagnosis:—

1. In aortalgia, radiation of pain frequently occurs into both arms; in angina, on the other hand, the pain is nearly always confined to one arm only, usually the left.

2. Radiation of pain below the level of the elbow is rare in aortalgia; in angina, it frequently radiates along the ulnar aspect of the forearm to the inner two digits of the hard.

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3. The pain tends to be located higher in aortalgia, being usually behind the upper third of the sternum; true anginal pain is most frequent behind the middle third of the sternum.

4. Feelings of anxiety or angor animi are unusual aortalgia; the patient may, however, experience a feeling of 'choking' in the neck.

- 5. Tenderness to pressure over the left brachial plexus is a feature characteristic of aortalgia, as shown by Schmidt; three of the cases reported here presented this feature.
- 6. In aortalgia, a band or zone of hyperæsthesia or hyperalgesia often appears in the inter-scapular region at the back, usually to the left of the mid-line and in the distribution of the second, third and fourth thoracic segments of the cord.
- 7. Pain, as a rule, tends to last longer in aortalgia than in angina.

Sequelæ, such as feelings of numbness or tingling, are more persistent and intractable in

9. Transitory electrocardiographic alterations (e.g., inversion of the T waves), described during attacks of angina, have not been observed in aortalgia.

secondary Causation.—Aortalgia is diseased conditions of the aorta, usually of the nature of syphilitic aortitis or atherosclerosis. It has been suggested by some German workers that mere increase in the tension of the walls of the aorta may lead to the symptoms of aortalgia.

Libman (1926) has maintained, in spite of opinions to the contrary, that essential hypertension, even in the absence of coronary disease, can cause angina pectoris. It is conceivable that some, if not the majority, of anginal attacks encountered in uncomplicated essential hypertension are of the nature of aortalgia and induced by increased tension on the walls of the aorta, in that disease.

The tendency, at the present day, is to attribute angina pectoris, in accordance with Burns' (1809) theory, to myocardial anoxemia resulting from coronary disease. Well-known authorities like Allbutt (1915) and Wenckebach (1924) have, on the other hand, supported the aortic theory of origin of angina. Considerable evidence has been put forward in order to substantiate each of these theories of angina; in the face of such evidence, it is highly probable that angina may, in fact, have a dual origin; though of coronary origin in most cases, it may, at times, be secondary to diseased conditions of the aorta. Such a possibility has been suggested by several authors on the subject. Whether the angina of aortic origin can be clinically distinguished from that of coronary origin and whether angina of aortic origin always conforms to the clinical description of aortalgia, presented above, are problems which remain These matters are in need of further unsolved.

STUDIES IN THE EPIDEMIOLOGY OF PLAGUE IN H. E. H. THE NIZAM'S DOMINIONS: COMPARISON OF CER-TAIN FACTORS IN A PLAGUE-INFEC-TED PLACE WITH THAT OF NEIGH. BOURING PLAGUE-FREE AREA

By S. RAGHAVENDER RAO, L.M.S. (Hyd.), D.T.M., D.P.H. (Cal.)

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THE geographical distribution of plague has never been uniform throughout the world at any time, even during different pandemics. Some places were affected badly, some suffered only from mild epidemic outbreaks, while still some others were fortunate enough to escape altogether from the ravages of this disease. India has been no exception to this phenomenon. Here almost the entire east coast and practically the whole of Eastern Bengal and the Province of Assam have been, so far, free from plague infection.

During the last pandemic, the freedom from plague enjoyed by most of the European countries is attributed to the improvements that have taken place in the last two centuries in environmental and personal hygienic conditions which make the association of the rodents with human beings more difficult. Still, one is at a loss to explain satisfactorily why certain places escaped plague infection during the previous pandemics, when the general sanitary conditions in those countries were not very different from those to be found at present in the countries where plague is still prevalent. The causes for the subsidence or the ultimate disappearance of the pandemics also are not very clear at present.

(Continued from previous column) investigation and are likely to modify considerably our present-day views on the genesis of anginal pain.

#### Summary

- 1. Four cases of angina of an unusual type are presented; they conform to the clinical description of 'aortalgia' furnished by German authors.
- 2. The diagnostic criteria for the condition (aortalgia) are given and its causation briefly discussed.

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The Advisory Committee on Plague in India (1911) tried to explain the freedom of East Bengal and Assam to plague infection to the following causes:—

1. Peculiarities of geographical situation and difficulty of means of communication from place to place, particularly during monsoons.

2. Habits of the people and the nature of the construction of the houses and huts were such as to render suitable shelter and food for rats difficult.

3. Presence of a large number of *Crocidura* coerulea (musk rats) which are natural enemies of rats. However, in their later reports, the Commission left the question open by stating that the freedom from plague enjoyed by some places might be due to other factors unexplainable at present.

Hirst in 1912 described a newly-discovered species of xenopsylla, viz, X. astia and he subsequently found that the rats of two of the principal cities of the Orient, Colombo and Madras, were infested with X. astia, exclusively.

Philip and Hirst (1917) carried out their first series of experiments on the transmission of plague with X. astia with negative results and put forward the hypothesis that the relative freedom of Ceylon and certain parts of South India from plague was to be attributed to the relative inefficiency of X. astia as a vector of plague both from rat to rat and from rat to man.

Later experiments of Hirst (1926) showed that the climatic factors, particularly temperature and relative humidity, had varying effects on the developmental stages, as well as on the transmission mechanism of the different species of rat-fleas.

Goyle (1928), on the other hand, showed that in the United Provinces of India the predominance of X. astia and a fairly severe incidence of plague in a place were not incompatible. To him it appeared that proximity to infected places and facilities for communication with them were more important than the fleaspecies factor in determining the incidence of plague.

So far in this connection, that is the comparison of the plague-infected with plague-free places, only such places have been compared that are situated at a great distance from one another. It was thought that more useful information could be obtained if such plague-infected and plague-free places were to be compared that were situated quite close to and in free communication with one another.

Two such places in H. E. H. The Nizam's Dominions are Hyderabad city (plague-infected) and Nalgonda (plague-free).

Hyderabad city was first infected with plague in the year 1911. During the first 10 years there were four severe epidemics of plague with

intervals of plague-free years (vide, table I). Since then moderately severe or mild epidemics have been more or less the annual feature of the city. From Hyderabad city the infection spread to many places in the western half of the Nizam's Dominions\* while several places in the eastern half, known as the Telangana area, in spite of imported cases have remained so far free from infection, Nalgonda, a district headquarters town about 64 miles from Hyderabad, is a typical example of the places in the latter category.

Table I

Plague incidence in the city of HyderabadDeccan

Year		Attacks	Deaths
1911–1912		18,478	16,901
1912–1913			
1913–1914			
1914–1915			14,980
1915–1916		16,983	14,980
1916–1917			
1917–1918			
1918–1919		.:	1.004
1919–1920		2,414	1,834
1920-1921		6,330	5,148
1921–1922		943	694
1922–1923			181
1923-1924		248	6,301
1924–1925		7,600	2,554
1925–1926		3,437	194
1926–1927 1927–1928		260 6,254	5,015
1927-1928			905
1928-1929		1,335 599	410
1929-1930		1,780	1,132
1931–1931		1,700	1,102
1932–1932		1,762	1.101
1932–1933		318	188
1934–1935		679	410
1935–1936	1	328	193
1936–1937		535	270
1937–1938		92	48
1938–1939		207	104
1900-1909		201	
TOTAL		70,582	58,563

A thorough rat-flea survey of Hyderabad city was carried out and the results published some time back (Walker, Chenoy, and Rao, 1931). The results of this survey were as follows. Of the rodent population of the city 74.4 per cent. belonged to the species Rattus rattus and 24.9 per cent. to Mus musculus (mice). The rest (less than one per cent.) consisted of Gunomys varius (field rats), Crocidura coerulea (musk rats) and Bandicoota indica. Of the 13,743 fleas examined, 12,994 (94.2 per cent.)

<sup>\*</sup>Though some districts in the western part of the Dominions, bordering on the Bombay Presidency, were infected as early as 1898, yet it was not till Hyderabad city itself was infected that plague began to spread throughout this area, first cases being generally the imported ones from the city.

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were X. cheopis, and the rest (792 or 5.8 per

cent) were X. astia.

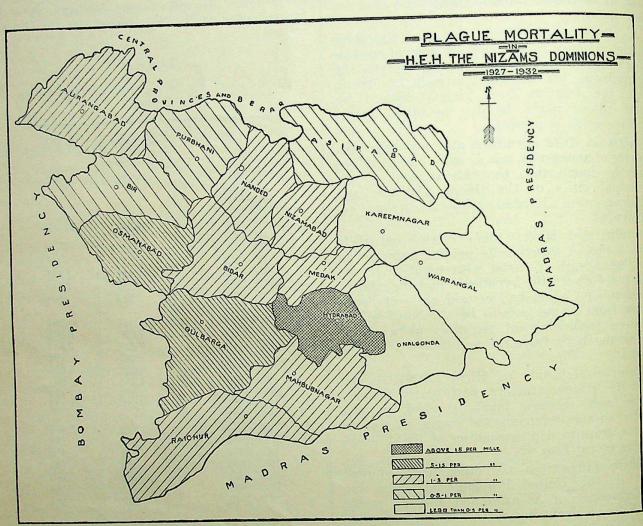
To compare the rat and flea factors of this plague-infected city with those of Nalgonda, a rat-flea survey of this latter place was undertaken by the author and the following is a short summary of the survey report :-

been 25 inches. During the period of survey the meteorological conditions were as follows:

Mean dry-bulb temperature at 8 a.m. 94.2°F Mean wet-bulb temperature at 8 a.m. 76.0°F Mean relative humidity 39 per cent.

Mean saturation deficiency 0.984 in.

MAP



Rat-flea survey of Nalgonda

Geographical situation.—Nalgonda town is the headquarters of the district of the same name and has a population of 10,058. It is situated 79° 14′ 57" N. and 17° 4′ 9" E. The town proper is located between the two hills lying on its northern and southern sides.

There are two small tanks within the municipal limits, but they are dry during most of the year. Two miles from the town is the largest tank of the district, known as the Pangal tank. Quite close to the tank is Pangal village where several old temples with beautiful sculptures and stone inscriptions of archæological interest are to be found.

Survey work was commenced on 12th May, 1931, and closed on the 19th of the same month.

The climate of this place is generally hot and

Maxim temperature recorded during the period was 110.5°F. and the minimum 82.0°F.

Both wet and dry cultivations are carried out round about the town. The chief agricultural products of the neighbouring places are rice, jawar, bajri, and castor seeds.

Exports and imports.—The chief exports from this place in order of importance are castor seeds, rice, bajri, tobacco, cotton and onions. Oil seeds are exported chiefly to Bombay and occasionally to Cocanada. The imports are wheat and jaggery from the Punjab, salt from Bombay, chillies from Warrangal and also to a certain extent from the punjab. certain extent from the neighbouring villages, kerosine oil from Madras, and other substances, such as pulses, turmeric, sugar and jawr (white), either directly from places where they are produced or more often from wholesale mer dry. Average rainfall for the last bix and sangri chants, both at Hyderabad and Bhongir. The 1.2°F.

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chief railway station through which both the import and the export trade is carried on is Bhongir, on H. E. H. the Nizam's State Railway broad-gauge line. It is 48 miles from Nalgonda, with which it is connected by a metal road.

Housing conditions.—The town proper between the two hills is thickly populated. Houses are built quite close together, the intervening lanes being very narrow and dirty. There are no drains except on the main roads. The houses of the middle and the well-to-do class of people have country-tile roofs, while the rest have only thatched roofs. The gunjes (grain godowns and markets) though built separately are heavily rat-infested. The extended town in the Rambiri Mohalla possesses fairly good sanitary conditions with better types of bungalows and houses.

Plague history of Nalgonda.—No indigenous case of plague has been reported as yet from Nalgonda. Occasionally, a few cases were imported from the neighbouring infected places, such as Hyderabad and Bhongir, but these never gave rise to any indigenous case or rat-

mortality.

Method of work.—The whole town was divided into sections roughly corresponding to the municipal wards. Modified double-chamber 'Wonder' traps were laid for one day by turn in each of these sections, with the exception of the gunj area where they were laid for 3 days. In each section or ward the houses or shops were selected for trapping in such a manner as to give a thoroughly representative sample of that section. Two coolies aided by a sanitary subinspector distributed these traps in the selected houses every evening. These traps were cleaned with water thoroughly every third day and on the other days were only exposed to light and air for a few hours in the locality. This method of cleaning traps in the experience of the plague department in Hyderabad has proved very efficient. Washing the traps every day did not prove any improvement, while smearing the traps with mustard oil or any other oils distinctly reduced their value as rat-traps. Besides, this would have also interfered with the flea survey work by some of the fleas adhering to the traps and thus escaping notice.

A uniform bait of dough made from wheat flour was used in all these traps throughout the survey. Traps were collected from the houses in the early morning and those traps that contained single rodents were immediately covered with a clean white canvas bag and sent back to the field laboratory, temporarily located in the compound of the local civil hospital, for the

collection of fleas.

The traps, covered with bags, were transferred here to an air-tight wooden box in which they were exposed to petrol vapour. This not only killed the rats but also killed all the fleas on them in about half an hour's time. After this interval, the traps with the bags were slowly removed and placed over a table with raised

edges and covered with a white water-proof sheeting (vide fig. 1). The bag was then removed from the trap and all the fleas in the bag were collected. The rat was then taken out of the trap and combed. Any fleas that fell out during the process of combing were added to those that were collected from the bag. Finally, the rat was thoroughly beaten on the table to let loose any fleas still adhering to it. It was only rarely that this additional process of beating or hammering of the rats on the table yielded an additional flea or two. The fleas from each rat were collected in a separate test-tube labelled with the date and the species of the rats from which these fleas were collected. The following method of clearing these fleas for identification purposes was adopted. The fleas were first heated gently in a test-tube with rectified spirit for two or three minutes to de-hydrate them

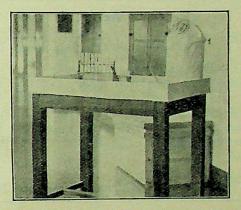


Fig. 1.—Nature of the table used for the collection of fleas.

completely and they were then cleared by again gently heating them in aniline oil for two minutes. They were mounted on a slide in balsam and examined under a low-power microscope. This process rendered the fleas fairly clear so as easily to show their typical characteristics for the purpose of identification.

All the dead rats from which the fleas had been removed were then dissected to find out any macroscopic signs of acute, chronic, or resolving plague. Smears were made from the spleen, liver and heart blood and stained with carbol thionin and by Gram's method and examined under the microscope for the presence

of Pasteurella pestis.

Rats.—Details are given in table II. Total number of rodents trapped was 152, of these only two were mice and the rest Rattus rattus. Female rats were found in larger numbers than male rats. The density of rat population was not only high in the gunj and bazar area, but also in some of the residential quarters, such as Hajjamwadi and Dhedwadi. The high density of the rat population in these areas is due to the housing conditions of these, localities. Houses, both on account of the nature of their construction, as well as the habits of the inmates, afford ample shelter and food for rats.

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sale mer. The All the rats trapped were autopsied but none of them showed any signs of plague in any form (acute, chronic, or resolving). these two places. They were quarantined for ten days in Hyderabad so as to exclude the chance of any naturally-infected plague rats

Table II

Rat density in Nalgonda

		Number of	Number of	Rat-	R. r	attus	Mus. musculus (mice)		
Serial number	Locality	traps set	rats caught	density *	Male	Female	Male	Female	
1 2 3 4 5 6 7 8	Latifgunj Shah Bazar Dhedwadi Hajjamwadi Telangana Mohalla Dhangar Mohalla Ramgiri Mohalla Bhimpet	150 50 25 25 25 20 5	84 21 13 15 8 6	56 42 52 60 32 30	29 8 4 6 3 2	54 13 9 9 5 4 2	::	1     i	
	TOTAL	350	152	43.4	54	96	••	2	

<sup>\*</sup> Rat-density in this table means the number of rats caught for every 100 traps set.

Fleas.—Details are given in table III. Total fleas caught on rats were 332. The two mice caught did not have any fleas on them. All those fleas belonged to the species X. astia. One hundred and thirty-seven were male fleas and the rest females. The flea index was high in

being included among them. They were then taken to the Haffkine Institute, Bombay, by train in two different cages.

After allowing another week's rest in Bombay for these rats to overcome the effects of the journey, altogether 100 rats from Hyderabad

Table III

General and the specific Rattus rattus flea-indices in Nalgonda

Serial		Rattus rattus	Fleas found	X. 0	astia	Astia index	X. ch	eopis	Cheopis index	
number	Locality	examined	Fleas lound	Male	Female	Tistia Titae.	Male	Female		
1 2 3	Latifganj Shah Bazar Other localities	83 21 46	181 100 51	83 37 17	98 63 34	2.1 4.7 1.1	••			
	TOTAL	150	332	137	195	2.2				

the Shah Bazar area and in the gunjes. In the residential quarters this index was comparatively low.

Susceptibility of rats to plague infection

As Rattus rattus formed the chief rat population of both Hyderabad and Nalgonda, it was decided to test these rats for their susceptibility or resistance to plague infection. This would also throw some light, it was thought, on whether severe continued infection for the last 29 years in Hyderabad has made any significant difference in the resistance of the rats of this place to plague infection as compared to that of the R. rattus from Nalgonda which has remained so far free from plague infection.

Accordingly rats were collected from different localities of Hyderabad and Nalgonda so as to form a really representative sample of rats from and 90 rats from Nalgonda were inoculated with a test dose of plague bacilli. With each batch of these rats 10 R. rattus from Madras and with the second batch 10 R. rattus from Bombay were also included as controls. The standard test dose used was the same as is used in the Haffkine Institute at present and described by Sokhey and Maurice (1935) and Sokhey (1936). The results of these tests were as follows (see also table IV):—

		A STATE OF THE PARTY OF THE PAR	THE RESERVE OF THE PERSON NAMED IN
Place to which the rats belonged	Total num- ber of rats tested	Rats died of plague	Mortality rate per cent
Hyderabad Nalgonda Madras Bombay	100 90 20 10	78 81 19 1	78 ± 4.1 89 ± 4.4 95 ± 4.8 10 ± 3.0

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TABLE IV

Results of experiments for testing the resistance of Hyderabad and Nalgonda rats to plague infection

Thoow		of organisms into each rat tested		NUMBER OF RATS THAT DIED ON DAYS SHOWN									survived					
Locality and the species of the rats tested	Duration of the experi- ment	Number of o incoulated into	Total rats tested	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	o p	Mortality per cent
1. Hyderabad— Rattus rattus Rattus rattus	27th April to 18th May. 11th May to 1st June.	2,625 170	40 60		••	3	5 7	12 10	3 8	6	6	5	1 2	2		2	8 14	80.0 76.7
TOTAL			100	••		3	12	22	11	12	6	5	3	2		2	22	$78.0 \pm 4.1$
2. Nalgonda— Rattus rattus Rattus rattus	27th April to 18th May. 11th May to 1st June.	2,625 170	40 50		••	2	9 12	9 12	3 5	4 6	5 5	1 3	1	1 1	1	1	5	87.5 92.0
TOTAL			90			2	21	21	8	10	10	4	1	2	1	1	9	90.0 ± 9.0
3. Madras— Rattus rattus Rattus rattus	27th April to 18th May. 11th May to 1st June.	2,625 170	10	•	•••		1	4 3	3	2 2	••	1		2	••	••	1	90.0
Total			20				1	7	3	4		1		2	••		1	$95.0 \pm 4.8$
4. Bombay— Rattus rattus	11th May to 1st June.	170	10				1					••	••			••	9	$10.0 \pm 3.0$

From the above results it appears that Nalgonda rats are as susceptible as Madras rats, while Hyderabad rats in spite of the long-continued severe infection have not attained the same amount of resistance to plague infection as that of Bombay rats. The difference between the mortality rates of Hyderabad R. rattus and Nalgonda R. rattus, though small (11 per cent), is significant, the standard error of this difference being ± 4.49. The difference in the mortality rates between Nalgonda R. rattus and Madras rats  $(6.0 \pm 5.9)$  suggests that this small difference may have occurred by chance, and that the samples are not probably different as far as their power of resistance to plague infection is concerned.

A remarkable fact in these experiments to be noticed was that the average duration of the illness was the same in all fatal cases, irrespective of the place from which the rats came (Bombay excepted, on account of small number of rats examined) and the average amount of the receipt as the resistance to infection found in the group as

a whole. This shows that probably in all the places examined there are different strains of rats, some susceptible and some resistant, and that the susceptible strains from all places behave in the same manner, irrespective of the amount of the previous experience of plague that the place has had.

#### Discussion

Of the several factors concerned in the epidemiology of plague, the species of fleas present and the prevailing climatic conditions seem to play a very important rôle.

Though both X. astia and X. cheopis can transmit plague under favourable conditions, the former appears to be more sensitive to climatic variations than the latter. The Indian Plague Commission of 1908 showed that infected ratfleas clear themselves of plague bacilli much more rapidly at 90°F. than at lower temperatures and also that a greater proportions of successful transmissions can be obtained at temperature below 85°F. The Plague Commission, however, was working with a mixture of rat-fleas which probably included all the three species

common in India.

Taylor and Chitre (1923) working in Bombay obtained equally successful results both with X. astia and X. cheopis during the colder months of January and February, while they failed to do the same with X. astia in the comparatively hotter month of March. Hirst (1926) working with X. astia failed to obtain successful tranmission of plague in rodents in his experiments at room temperature, but was able to do so in one case at a reduced temperature in a saturated atmosphere.

As far as Nalgonda is concerned it is always in free communication with the neighbouring infected places and epidemic centres and has also a dense population of highly susceptible rodents. In spite of these facts, its freedom from plague can only be attributed to its fleapopulation which consists entirely of X. astia. This alone again would not have prevented its having at least occasional mild epidemics of short duration had it not been for its hot and dry climatic conditions which make fleas of this species quite inefficient as vectors of plague.

#### Summary

A plague-infected place (Hyderabad) and a plague-free place (Nalgonda) quite close to and in free communication with one another have been compared with regard to their rat population and flea infestation.

Rattus rattus has been found to be the prevailing species of rat in both these places.

While more than 94 per cent of fleas found in Hyderabad belong to the species X. cheopis, the entire rat-flea population of Nalgonda consists of the species X. astia.

The climate of Nalgonda is generally hot and

The rats of Nalgonda have been found to be

highly susceptible to plague infection.

Rats from Hyderabad, though more resistant to plague infection than Nalgonda rats, have not attained the same amount of resistance as the Rattus rattus of other plague infected places, such as Bombay.

It is suggested that the climatic conditions in Nalgonda make X. astia, an already inefficient vector of plague, doubly so and hence the freedom of Nalgonda from plague, in spite of its close proximity to plague infected centres.

My thanks are due to Col. Norman Walker, C.I.E., I.M.S (retd.), late Director of Medical and Public Health Department, H. E. H. the Nizam's Dominions, and to Dr. C. F. Chenoy, the special plague officer at that time, for giving me all facilities for making the rat-flea survey of Nalgonda. Dr H. Hyder Ali Khan and Dr. M. Faroog, the present director and the deputy director, respectively, of the Hyderabad Medical and Public Health Department, were kind enough to give all departmental help for the

(Continued at foot of next column)

#### AN EXPERIMENT IN COOLIE LINE SANITATION

EFFECT ON HOOKWORM INCIDENCE By K. P. HARE, M.B., B.S., L.M.S.S.A. Medical Officer, Tingri Medical Association. Hoogrijan P. O., Assam

#### Introduction

THE principal causes of invaliding among tea estate coolies in Assam are malaria, pulmonary diseases including influenza, injuries, water sores (ground itch) and anamia. In the fourth of these causes, invasion by hookworm larvæ is almost certainly the pathogenic factor and massive hookworm infections are probably associated with other factors in the production of anæmia. Fortunately for the sanitarian, both malaria and hookworm disease are caused by parasites which can, even if with difficulty, be prevented from coming into contact with their human hosts. In the case of hookworm disease, this prevention will be most complete if matters are so arranged that egg-containing fæces are removed from the possibility of contact with human feet. This removal must, usually, be by mechanical means. By a fortunate chance, a very usual method of spread of the bowel diseases is through the

(Continued from previous column)

collection and transmission of rats from Nal-

gonda and Hyderabad.

Dr. R. B. Lal, the Officiating Director, the All-India Institute of Hygiene and Public Health, Calcutta, was kind enough to make arrangements with the authorities of the Haffkine Institute, Bombay, for allowing me to carry out the animal inoculation tests there and also giving me advice and help during the work. Finally, my thanks are due to Lieut.-Col. S. S. Sokhey, I.M.S., Director of the Haffkine Institute, Bombay, who kindly gave me all facilities and advice for my experimental work at the Institute.

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agency of flies which have settled on infected fæces. Thus, any method of disposal of fæces which removes infective matter out of harm's way will be an effective means of controlling bowel diseases also.

In February 1938, an isolated coolie line of average size was completely equipped with bore-hole latrines at the rate of one latrine per family. The preliminary investigations and the constructional work were described in a previous paper (Hare, 1938) and a later report (Hare, 1939) recounted the experience gained during the rains of 1938 and the effect that sanitation had had on the general health of the population. The present report is a review of twelve months' working of the experiment which, from the point of view of the management, has proved so successful that several hundreds of these latrines are now in existence on this and neighbouring estates.

#### Hookworm incidence

The incidence of hookworm infection in a control line which has no sanitation was found to be as in tables I and II, taken from the second paper on this experiment (loc. cit.). The incidence in the Balimara line previous to the installation was not known but was judged to be approximately equal to that shown in table IV, also taken from the second communication. Reasons for this statement are given in that paper. Using the same technique as before, stool surveys were again carried out on the control line and the Balimara line in March 1939 and the results are recorded in tables III and V.

Table I

Stool survey of 112 persons, being the total population of the control line, carried out in March 1938

Infect	ion	Number infected	Percentage incidence	
All helminths Hookworm Ascaris			103 97 54	91.9 86.6 48.2
Trichuris	••		61	54.4

## Table II Stool survey of 113 persons, being the total population of the control line, carried out in November 1938

Infection	Number infected	Percentage incidence
All helminths	107	94.7
Hookworm	94	83.2
Ascaris	77	68.1
Trichuris	59	52.2

#### TABLE III

Stool survey of 111 persons, being the total population of the control line, carried out in March 1939

Infection		Number infected	Percentage incidence	
All helminths			104	96.0
Hookworm			94	84.7
Ascaris			62	55.9
Trichuris			56	50.0

#### TABLE IV

Stool survey of 126 persons, being the total population of the Balimara line, carried out in November 1938

Infection			Number infected	Percentage incidence
All helminths			121	96.0
Hookworm			103	81.7
Ascaris			95	75.4
Trichuris			88	69.8

#### TABLE V

Stool survey of 120 persons, being the total available population of the Balimara line, carried out in March 1939

Infection		Number infected	Percentage incidence	
All helminths			110	91.7
Hookworm			88	73.3
Ascaris			88 85 73	70.8
Trichuris			73	60.8

Note.—The actual population of the line at the time of the survey was 130 but stools could not be obtained from ten of them owing to advanced pregnancy, recent delivery or absence from the estate, either visiting friends or recruiting new labour.

The expected absolute cure-rate of hookworm infection from a single dose of tetrachlorethylene was found by Hare and Dutta (1939) to be 48.3 per cent. If, therefore, no reinfection had occurred in the meanwhile, the expected hookworm incidence in the control line in March 1939 should have been 51.7 per cent of 83.2 per cent, that is 43.0 per cent, instead of which, it was 84.7 per cent, almost double the expected figure. Reinfection was, therefore, taking place continuously in the control line, in spite of the adverse conditions represented by the dry cold winter. In the Balimara line the expected hookworm incidence in March 1939 can be calculated as 51.7 per cent of 81.7 per cent, that is 42.2 per cent. In fact, it was 73.3 per cent, an increase of about two-thirds. Reinfection is, therefore, still taking place, but not at such a rapid rate

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as in the control line. Moreover, in the course of carrying out the survey, one was struck by the fact that, judging by the number of ova seen, the infections in the Balimara line population were much lighter than those in the people living in the control line.

My impression is that, over a period of years, the provision of latrines will reduce the incidence of hookworm infection to an innocuous level, but that such a result cannot be hoped for quickly. Since the reinfection that does occur almost certainly occurs in the fields and from the earthen floors and surroundings of the houses, and not from the latrines themselves, it is reasonable to expect that these infective larvæ will gradually die out. Moreover, the same circumstances would obtain whatever type of latrine was installed so that the bore-hole type does not suffer from inefficiency and has the great merit of cheapness.

#### Incidence of dysentery

In the second report (loc. cit.) on this experiment the numbers of cases of dysentery occurring during nine months in the Balimara line and in the remaining lines of the Dirial estate were recorded. These figures can now be revised to cover twelve months and are set out in table VI.

TABLE VI Dysentery on Dirial Tea Estate

Line	Period of observation	Number of cases	Percentage incidence
Balimara	June 1936	9	6.9
Other lines (	May 1937	38	3.7
Balimara (	June 1937	3	2.3 (3.1)
Other lines (	Teb. 1938	27	2.6 (3.5)
Balimara (	March 1938	5	3.5 (2.1)
Other lines	Feb. 1939	50	5.1

Tube wells were sunk in 'other lines' in May 1936 but not in the Balimara line until May 1937. The result of the good water supply was to bring the incidence of dysentery in the latter line down to that of the remainder of the estate. I have inserted in brackets, against the incidence figures for the June 1937-February 1938 period, the calculated incidence for a twelve month period. I have also inserted, in brackets, against the Balimara line incidence for 1938-39, the figure 2.1. This would be the percentage incidence if two cases were ignored. As I mentioned in my second report, there is reason to believe that two cases were infected quite away from the estate. In any event, the difference in the incidence rates is quite marked and shows that the installation of latrines, combined with

(Continued at foot of next column)

REMARKS ON THE ÆTIOLOGY SYMPTOMS OF YOUNG-DAH-HTE WITH A REPORT ON FOUR CASES AND ITS MEDICO-LEGAL SIGNIFICANCE

By R. M. LLOYD STILL, M.R.C.S. (Eng.), L.R.C.P. (Lond.)

MAJOR, I.M.S.

Medical Superintendent, Mental Hospital, Tadagale

A type of neurosis is found in Burma known as young-dah-hte, the literal translation of which is 'to be ticklish and nervous'. The condition is characterized by paroxysms of apparently purposive actions which occur independently of the will as a result of a given stimulus.

I have noticed two distinct

sufferers :-

Type I.—Individuals who react to sudden stimuli by imitating words, gestures and actions of those in the immediate neighbourhood. They may or may not utter an obscene epithet at the same time.

Type II.—Those in whom a sudden tactile or auditory stimulus produces a severe response. They jump and recoil as though they had received a great fright, uttering at the same time an obscene or unintelligible epithet. These individuals are extremely ticklish and nervous and continued stimuli cause them to get into a very distressed condition.

Prevalence.—In urban areas there are stated to be about one or two persons in each village who exhibit this condition and whose rôle is

(Continued from previous column)

the provision of a pure water supply, is capable of bringing about a satisfactory reduction in the incidence of dysentery and, presumably, of other bowel diseases also.

#### Conclusions

Reading this experiment, as a whole, I think

it can be fairly claimed that :-

1. In suitable soils the bore-hole latrine, properly constructed and with a well-designed superstructure, is a cheap and effective method of sanitation with a reasonable length of working life.

2. The adoption of the principle of one latrine per family is more likely to meet with the co-operation of the coolie class than the

provision of communal latrines.

3. The provision of effective sanitation, combined with a pure water supply, will bring about a reduction in the incidence of bowel disease and hookworm infection and invasion and, therefore a reduction and invasion and, therefore, a reduction in the incidence of watersores and, possibly, anæmia.

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Hare, K. P. (1938). Indian Med. Gaz., Vol. LXXIII, Hare, K. P. (1939). *Ibid.*, Vol. LXXIV, p. 340. Hare, K. P., and Dutta, S. C. (1939). *Ibid.*, Vol. LXXIV, p. 198. 40

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comparable to that of the village idiot in so far as children frequently tease and make fun of them. They are looked upon as harmless people but I will later proceed to show how they may assume medico-legal importance. If a crime is committed by such a sufferer, the fault and punishment should not fall on him, because of his lack of control, and in some cases the in-dividual who made the suggestion might have to be considered the guilty party.

Cases which fall into type I are closely related to the Malayan condition of latah (in connection with which there is a considerable amount of literature), and the condition of miryachit of Eastern Siberia, and type II bears some relationship to the convulsive ties which in Europe have been carefully studied by Charcot, Gillis

de le Tourette, Guinon, and others.

Incidence.—It is stated to be more common in females than males, but personally I have seen more males than females, for the reason that cases observed by me have been inmates of this hospital and various jails in which males show a great preponderance over females. It is said to be more common amongst older people although three of the cases described in detail below are young. In the ordinary course of events these people will not be admitted to a mental hospital, but I have been fortunate in having four cases under my close observation, three as criminals and one as member of the hospital staff.

Ætiology.—(1) Predisposing cause appears to

(2) Immediate cause shock, worry or breavement, or, it is stated, from observation of and close contact with one similarly affected.

(3) There is no evidence that heredity plays any part in causation, nor that syphilis is a

In respect to (1) all cases of type I seen by me have been of the Mongolian race; and the closely allied conditions, latah and myriachit, occur amongst people with Mongolian admixture. But, I have seen one case of type II in an Indian from Madras who has been a resident of this country for 10 years.

It is of interest to note that the Mongolian religions are mostly Animism, Lamaism, Buddhism, Mohammedanism, Confucianism and Taoism and that their medicine is mostly theurgic. Crookshank emphasizes the fact that the Mongolian idiot is very prone to mimicry.

The uneducated Burman, although nominally of the Buddhist faith which prohibits belief in wandering spirits, is in reality an animist and believes in ghosts and in good and evil spirits. These are called nats many of whom have their abode in large trees and for this reason it is very difficult to get the uneducated Burman to fell a tree for fear of liberating them and so incurring their wrath. They keep nat shrines in their houses and under trees, and offer them Cooked chicken, tobacco, cigars, plantains, etc. The Buddhist monks, who are as a rule the first to be consulted in any case of mental disorder and whose usual treatment consists in beating the spirits out of the sufferer, have no treatment for young-dah-hte, and in fact it is not considered to be a condition which carries any social stigma, and is not looked on as an illness.

Symptomatology.—The mental development of these persons appears to be the average of their fellows and they display no symptoms of any recognized psychosis; it would appear however that they possess feeble higher centres, which are easily upset, so they are unable to control the lower centres in the accustomed manner. No abnormal physical signs can be detected, other than hyperæsthesia and exaggerated reflexes with, in some cases, a pseudoparæsthesia, and these signs can always be elicited and are not related to the display of symptoms. As a general rule they exhibit no signs of hysteria, but case 2 (v. i.) has a history of trance-like states, amnesiæ and hysterical fits in addition to being of an unstable tempera-

The condition of type I as observed in Burma is characterized by a hyper-acute state of suggestibility and imitativeness which appears to be quite involuntary.

Usually echopraxia, echolalia and coprolalia are displayed. The stimuli required to provoke these abnormal reactions are tactile, auditory or visual but in contradistinction to the Malayan latah there is no clouding of consciousness.

Dr. van W. Palthe (1933) says that latah is certainly not a psychosis, still less is it hysteria. He also describes the individual as being thrown into a condition of latah and remaining so as long as the examiner busies himself with him, differing from young-dah-hte in which the individual is always in the condition and liable to react to given stimuli.

On being struck, a sufferer from this condition will immediately strike back at the nearest person to him, and the force with which the action is performed is similar in all respects to the force used against him, i.e., if a gentle touch is given to the sufferer, a similar gentle action is returned, but, if a forceful blow is applied, an

equally forceful one is given back.

Any action that is performed in front of him is imitated closely and words and phrases are imitated so long as they are addressed suddenly and abruptly. For instance, if you say 'What is your name?' in an abrupt manner, he will repeat 'What is your name' but if you address him in an ordinary tone he will give the correct answer to the question. The reaction to sudden tactile stimulus is usually accompanied by an obscene phrase or epithet, but immediately afterwards the patient is usually very sensitive and annoyed with himself for what he has said

In type II—imitativeness is not displayed but the sufferer reacts in a violent manner to a slight tactile or auditory stimulus by jumping and putting out his hands on the defensive, as

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though he had received a great fright, at the same time uttering an obscene epithet: I have observed that the obscene epithets are usually related to incest. They do not proceed to action and do not strike out as in type I. Even if they know that a person is standing behind or beside them they still react in the same manner. They are extremely ticklish.

#### Allied complaints

These include latah, amok, banga, schamanismus and nat-win-de.

Latah.—The description of the Malayan con-

dition is taken from Palthi (loc. cit.).

By latah is understood in Malayan countries a peculiar reaction to fright, which usually occurs among aged and uneducated women, and of which the most striking symptoms are a clouding of consciousness, echolalia and echopraxia.

A woman is called latah when by giving her a fright it is possible to throw her into such a condition that she repeats all words spoken to her, and imitates all actions performed before her with the purpose that she shall imitate them.

The patient remains in this condition as long as the examiner busies himself with her. Her state closely resembles a hypnotic rapport and frequently begins with the ejaculation of some obscene or meaningless word. If she is left alone or spoken to in a soothing way the peculiar condition of vacancy again subsides and she behaves like a perfectly normal person'.

The superintendent of the Singapore mental hospital has kindly supplied me with this and with several other references. He states 'I have not seen a case in the Singapore mental hospital, but the admissions are predominantly Chinese (68 per cent) (Tamil—16 per cent, Malay—10 per cent) and rural Malays are seldom seen. On the other hand the disease is certainly not prevalent, and is, I believe, becoming rarer as the older generation passes'.

Amok.—This is described as a psychical disturbance which develops into a violent attempt to kill people, succeeded by a stuporous condition no memory of which may be left; it occurs chiefly amongst Malays. The ætiology is stated to be a strong emotion of anger, sorrow or fear. The condition may be allied to epilepsy

or epileptic equivalents.

Banga.—A hysterical condition which occurs chiefly amongst women about the age of puberty in the Belgian Congo. No stigmata of hysteria are displayed. It is accompanied by convulsions, uttering of wild cries and impulsive rushes into open country or jungle.

Schamanismus.—Certain Dayaks and other peoples throw themselves into a condition of excitement for religious purposes. Eroticism is displayed and they sing, shriek and dance to utter weariness. Resembles the dancing mania of the middle ages and therefore would appear to be related to latah according to Castellani and Chalmers (1910).

Nat-Win-De.-A yearly festival is held near Mandalay, is particular, and also in other parts of Burma, which is devoted to the worship of Nats (spirits) and of which the chief feature consists in a dance, usually by women and occasionally by men and young boys. The dance is started by a professional and it is quite unlike the usual Burmese dance. It is accompanied by swaying movements, with the eyes closed. which continues so long as they think they are possessed by nat. They have no recollection afterwards of what they have done. The dance is taken up by other people.

It is stated that old-time warriors have become spirits and take a liking for certain women. These women are then supposed to have fortunetelling powers. People pay them for their for-

tunes to be told.

Amongst other related conditions are the 'jumpers', the 'barkers', and the 'jerks', at various times described in Europe and also Maladie de Gillis de la Tourette of which the main symptoms are echolalia and coprolalia. The jumping Frenchman of Maine was described by Dr. Beard in 1880.

Description of cases.—Of the four cases described below, three belong to type I and one to

type II.

Case 1.—A Burmese woman, aged 33, has been a patient in this hospital since 1928. She was admitted as an insane criminal having been acquitted of murder on the grounds of insanity. She murdered her husband with a dah (native knife) in the night without motive.

She was said to have had recurrent attacks of insanity for a period of four years before admission, and during these attacks she is said to have killed an ox with a dah, set fire to a hut, chased men, and been amorous

towards them.

It is also stated that she had periods of somnolence during which she could not be roused, but that between these attacks she had been normal in her behaviour and rational in speech and had been able to procure for herself two husbands in quick succession. The first husband is said to have deserted her owing to her husband is said to have deserted her owing to her strange behaviour in these attacks.

for amnesia She claimed complete amnesia for all these serious events in her attacks. At times she used to rush into the jungle, screaming and shouting for no reason; at others she beat her child causelessly and was aggressive. There is an interesting statement of a Burmese deater to the effect that he would be treat a Burmese doctor to the effect that he used to treat her for her attacks of somnolence or trance-like sleeps.

On admission, she is stated to have had no symptoms suggestive of schizophrenia of that duration and no history of epilepsy. The doctor in his notes on admission said that the obscuration of consciousness, the trance-like states, amorous excitement and aggressive ness suggested the combination of a psychosis with a ness suggested the combination of a psychosis with a psychoneurosis.

I suggest that it is possible that we have here

condition similar to the amok.

There is no mention of any imitative signs, as in imitative case 2, described in the notes taken on admission, for some years it has been recognized that she imitates all actions performed in her presence and is very suggestible. It would appear that she suffered from this condition (young-dah-hte) before her admission as she says that it developed suddenly after seeing the blood of her murdered bushend

If she sees a person dance, she dances; if she is struck, she strikes the person by her side; if she spesson by her side; if she spesson by her side; if she spesson by her side; if tickled or startled she shouts and uses abusive languages. Another peculiarity about her

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that if a question is put to her in a loud tone, she repeats the question, but if addressed in a normal manner she replies rationally. With the exception of this imitativeness and state of hyper-acute suggestibility has been classified as same since 1020 but the has been classified as same since 1020 but t this imitativeness and state of hyper-acute suggestibility she has been classified as sane since 1930, but she is a woman of unstable temperament, easily irritable, quarrelsome and erotic.

quarrelsome and erotic.

\*Physical signs.—Nothing other than general hyper\*\*esthesia and exaggerated tendon reflexes.

\*Case 2.—A Burman, male, aged about 60, was admitted for observation as to his mental condition on the 18th September, 1938, as he had killed another man without any motive, the circumstances leading up man without any motive, the circumstances leading up

to the murder were as follows: This old man, the accused, was travelling from one village to another and at dusk arrived at a rest house to spend the night. A servant in the rest house, who was a complete stranger to him, gave him a who was a complete stranger to him, gave him a block of wood for use as pillow and whilst doing so he dropped it on the ground at a distance of two or three feet from the accused. On hearing the noise, the accused picked up the block of wood and threw it at the servant's head, who thereby sustained cranial injuries as a result of which he died.

The defence maintained that this old man was in the

The defence maintained that this old man was in the habit of imitating all actions that were performed in his presence, and that he had been subject to this abnormal condition for the last seven or eight years, and it was stated to have occurred suddenly as a result of shock and worry over the death of several

members of his family.

On examination, he looked older than his stated age but was in fairly good health and of good physique. The only abnormal physical signs elicited were slight tremors of the tongue and fingers, pupils equal and regular but sluggish to light and reacted to accommoda-

Blood Wassermann ++; C. S. F. Wassermann negative; cell count 10 per c.mm.; Lange's test 1122100000

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He displayed the following peculiarities: If he were struck, tickled or in any way interfered with, he suddenly and spontaneously struck at any one who was nearest to him; if anything were thrown at him, a ball, stone or a match box, he immediately picked it up and threw it at whoever was nearest to him.

On one occasion in the jail before his admission, to test his reactions he was put to watch a flogging from inside a room with bars; he became very excited, picked up a stick and beat the iron bars forcibly and also endeavoured to hurl the stick at the bars. On another coverion her the stick at the bars of the latest the stick at the bars. another occasion, before he committed the crime it was stated that he was watching a man swimming when he fell on the ground and began to make swimming movements on the sand.

The patient whilst under observation was otherwise normal in behaviour; he ate and slept well, answered questions rationally, was correctly orientated but rather dulliband and the said an dull; he did not appear to appreciate the seriousness of the charge against him and, what is unusual in these people, he was not sensitive about his imitative-ness and in fact seemed to regard it in the nature of a joke. As he is suffering from cerebral-syphilis as well this may be the explanation. He is under trial at present and his case has not

as well this may be the explanation.

He is under trial at present and his case has not yet come up to the Sessions Court, so that it is not known whether young-dah-hte has been accepted in his defence to gain him an acquittal, but it must be realized that his positive Wassermann reaction and abnormal Langes test should alone carry considerable weight in his favour.\*

#### VITAMIN C AND OVULATION

By A. P. PILLAY, O.B.E., M.B., B.S. Bombay

During the course of certain investigations on vitamin C in its relation to corpus luteum, I tested the urine of women on various days of

#### (Continued from previous column)

Case 3.—A Burmese woman, aged about 30, is an ayah in this hospital. Her condition of imitativeness and suggestibility was observed accidentally. She states that this condition developed about five years previously, after child-birth. She is said to have been frightened by a severe thunderstorm when she was pregnant and became very nervous after this.

Her mental condition is normal. In a similar manner

to case 1 she imitates actions performed in front of her, repeats questions addressed to her unexpectedly, and shouts and abuses when she is in any way suddenly

She is very sensitive about her condition and if I touch her unawares she shouts out an obscene expression, but, having realized what she has done, she is

shame-faced and retreats from view.

Case 4.—A Burmese cultivator, aged 30, was admitted to this hospital on the 4th August, 1937, as a criminal patient who had assaulted one of his servants with a dah as a result of which he sustained serious injuries. No provocation or motive was elicited and for his defence a plea of insanity was successful. There is no previous history of insanity in his case, nor is there a family history. There is no history of drink or drugs, but he is stated to have had fever of unknown dries, for about two months previous to the grine. origin for about two months previous to the crime. He has been sane since admission, quiet and well behaved, hard working and reliable.

It was observed by accident that he was a very nervous individual. He is startled by any slight stimulus, e.g., if he is tickled, he shouts out and jumps as though he has been violently stimulated or has sustained a great fright; a noise or shout from behind sustained a great ringit, a hoise of shout from behind causes him to react in a similar manner. He does not show echolalia or echopraxia, nor does he strike out as do the other cases but there is no doubt that he is an example of type II.

I have noticed that although he knows that there is a man behind him he will go on repeatedly shouting out a world of abuse and improve the interest of the strike of th

out a word of abuse and jumping whenever he is

touched.

#### Summary

1. An unusual neurosis occurring in Burma is described and divided into two types.

2. The relationship of type I to other conditions occurring for the most part in Mongolian races and in particular to Malayan, latah, is stressed, and that of type II to the convulsive

Four cases are described in detail and the importance of the medico-legal complications which may arise is well shown in the description of case 2 who stood his trial in the lower court on a charge of murder, but the charge was changed to culpable homicide not amounting to murder in the Sessions Court and the patient sentenced to six months' imprisonment.

#### REFERENCES

Castellani, A., and Chalmers, A. J. (1910). Manual of Tropical Medicine. Baillière, Tindall and Cox, van W. (1933). Malayan Med. Journ.,

Vol. VIII, p. 133.

<sup>\*</sup>I have now received information that the man has been sentenced to six months' rigorous imprisonment, charged under section 304 I. P. C. (culpable homicide not amounting to murder). I have not yet received a copy of the judgment and I am therefore unable to say the grounds on which the magistrate sentenced him and why he was given such a short term of imprisonment.

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the menstrual cycle for its vitamin-C content. It was observed that the amount of vitamin C excreted varied from day to day, the lowest amount excreted being about the mid-menstrual period. In the graphs given below, the results are plotted and the peaks indicate the days on which the amount of vitamin C excreted is lowest.

According to the teaching of Ogino, the one constant feature in all menstrual cycles is the fact that the menstrual flow starts 14 days after ovulation. The peak in 15 out of the 24 graphs given falls on the day of ovulation, calculated on the teaching of Ogino. Increasing evidence shows, however, that there are anovular menstrual cycles and also multiple ovulations. These facts make the subject complicated.

Though the cases tested by me are too few to admit of generalizations, the graphs suggest that estimation of vitamin C in the urine may form an easy method for deciding the day of ovulation. Other conclusions may possibly also be drawn from them. The graphs depict also anovular menstrual cycles and multiple ovulations. The only convincing way of testing the correctness of the conclusion drawn is by laparotomy, but this could not be done in my series of cases. The subject, therefore, needs further investigation.

I tested the urine of 11 women during 24 menstrual cycles. 15 cycles supported my contention. Out of the 9 atypical cases, 2 appear to be anovulatory cycles and 2 abnormal. One had yet no menstrual flow. No explanation seems possible in 4 cases.

## Quantitative test for vitamin-C content of urine

Fresh urine, previously surcharged with vitamin C by administering to the women orally 300 mg. of Redoxon (Roche) 3 to 6 hours before the test, is titrated quickly into 5 c.cm. of a solution containing dichlorphenol-indophenol equivalent to 0.1 mg of 1-ascorbic acid. The quantity of urine required to decolorize, immediately and completely, the dye solution indicates the quantity of vitamin C present in the urine.

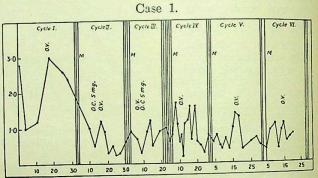
Tests done with urine not previously surcharged with vitamin C are worthless for this or any other diagnostic purpose. Freshly voided urine should be used and the test completed in 2 minutes.

#### Explanatory notes about graphs

In the graphs, the vertical figures indicate the quantity of urine in cubic centimetres required to decolorize 5 c.cm. of the dye solution and the horizontal figures the days of the menstral cycle. 'Ovulation' means the date of ovulation as calculated by Ogino's teaching. 'M' means the menstrual flow.

Relevant notes on the cases are given, also available data as regards days of coitus. Follicular hormone (Ovacylin 'Ciba') was administered by injections in 5 cases and these are noted on the graphs. Their effects on the length of the cycle and on the menstrual flow are readily seen from the graphs.

The variations in the vitamin-C content of the urine had no bearing on diet or on health, as the women were having their usual food during the tests and were generally healthy. A graph of the urine of a male is given for purposes of comparison. Cycles in which no urine test was done on the day of ovulation are taken as positive when there was a peak round about the ovulation date. The initial peak in the cycle of each woman indicates only that she was very deficient in vitamin C and the repeated administration of Redoxon for test purposes corrected the deficiency.

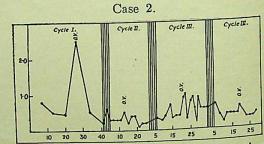


M = Menstruation (vertical lines).

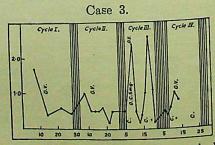
OC = Ovacyclin. OV = Ovulation.

LC = Lutocyclin. C = Coitus.

Case I.—Unmarried, age 31. Menses fairly regular but flow unsatisfactory. Six cycles were tested. Note multiple ovulation in the fourth cycle.



Case II.—Unmarried, age 15. Menses irregular. Note multiple ovulation in the third cycle. Four cycles tested.



Case III.—Married, age 21. One surgical abortion he nine months back. The first two cycles appear to be

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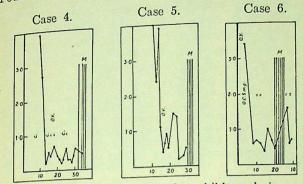
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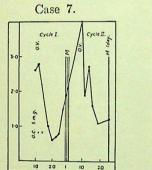
irregular. ur cycles anovulatory, while the third shows multiple ovulation. Four cycles tested.

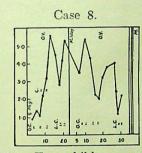


Case IV.—Married, age 26. One child aged six years. A few hours' flow on the 32nd day, no flow on the 33rd day and three days flow from the 34th day. Multiple ovulation (?)

Case V.-Widow, age 36. No pregnancy.

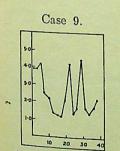
Case VI.—Married, age 28. One pregnancy 12 years back. Very irregular cycle, often extending from six to seven weeks. Course of Ovacyclin injections during the cycle under test.

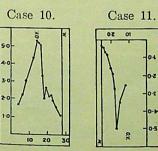




Case VII.—Married, age 26. Two children aged 12 and 10 years. Remarks same as in last case as regards irregularity and treatment.

Case VIII.—Married, age 35. Very irregular for the last four years, menses every four or five months. Last menses five months back. A course of Ovacyclin and Lutocyclin 'Ciba' during the two cycles under test was given. One day's flow in the first cycle and three days in the second. As date of last menses was not known, an arbitrary date was taken as the beginning of the cycle.





Case IX.—Married, age 25, three children, last being nine months old. No menses after that. A case of diabetes insipidus. Vitamin-C deficiency was very figures.

Case X.—Unmarried, age 29. Tests carried out by one-tenth of actual figures. Vertical figures are

Case XI.—Unmarried, age 24. Tests carried out by figures.

Vertical figures are one-tenth of actual

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#### A NEW METHOD OF TREATING LEUCODERMA

By D. PANJA, M.B. (Cal.)

and

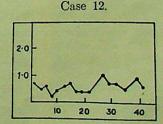
P. A. MAPLESTONE, D.S.O., D.SC., M.B., B.S., D.T.M. (From the Medical Mycology Inquiry, under the Indian Research Fund Association, School of Tropical Medicine, Calcutta)

The successful treatment of leucoderma is, for two reasons at least, an important problem for dermatologists and particularly for those who have to treat dark-skinned races, first because the disfigurement is much more apparent than in those with fair skins, and second because of the widespread but erroneous belief that it is a variety of leprosy and that a victim of the disease accordingly must be shunned by his fellows for fear of infection.

A great deal of work has been done on skin pigmentation, but the full understanding of the complicated chemical changes, which are dependent on endocrine functions, is far from being fully established, so treatment of leucoderma is mainly empirical and is rarely attended by satisfactory results.

Many years of experience of treating hundreds of cases at the Calcutta School of Tropical Medicine has led us to place our faith in external application of the oil extracted from the seeds of Psoralia corylifolia and known as bouchi oil, together with internal administration of intestinal antiseptics, but although persistence in this form of treatment is occasionally rewarded with success, partial or total failure has much more often been the final result. Recently, we have carried out a number of experimental treatments in which the oil has been injected intradermally instead of being rubbed on the skin, and our results have been so good that this short note is being published to draw the attention of other workers to this method. It is felt, however, that there is still much room for improvement in our technique, and this is only in the nature of a preliminary report.

(Continued from previous column)



Case XII.-Male, age 49.

My thanks are due to Messrs. F. Hoffmann-La Roche & Co., Ltd., and to their scientific representative in India, Dr. K. Schæffer, for placing samples of Redoxon and dye tablets at my disposal for carrying out these investigations.

abortion be

The oil so far employed for injection is exactly the same as that used for external application.

Method of treatment.—The patch to be injected is carefully cleaned with alcohol, and the oil is injected intradermally using an ordinary hypodermic syringe fitted with a fine needle. The amount of oil in each individual injection is a single drop (between 0.05 and 0.1 c.cm.). The number of injections varies with the size of the depigmented patch, small spots of 1 cm. or so in diameter only needing a single injection in the centre. In larger patches the injections are spaced about 1 cm. or a little more apart, until the whole area is covered. In two to three weeks, formation of pigment can be noticed, beginning at the site of the needle puncture from which point it spreads centrifugally. If, when deposition of pigment ceases, the contiguous areas of new pigmentation have failed to coalesce, a second and if necessary a third course of injections can be given in the intermediate white patches, until the whole area is normally pigmented once more. If the patch to be treated is several inches in diameter, and in consequence needs numerous injections to cover it completely, it has been found better to give a few injections fairly wide apart in the first instance and to follow with intermediate injections a few days later, than to try and cover the whole area at one sitting. The reasons for this modification are that injections are followed by a good deal of pain and if many are given at one time the pain is very severe, and also injection of the oil is sometimes followed by a small focal ulcer which remains small if the injections are wide apart, but, if several of these ulcers were to occur in adjoining injection sites, they might coalesce and form a relatively large lesion. It should be noted, that apart from the extra discomfort at the time and the subsequent scarring, ulceration has no ill effects on the final result as the scar always becomes pigmented.

The precautions outlined above in the treatment of large depigmented patches indicate the disadvantages of this form of treatment in its present form, and we are now engaged upon trying to lessen or eliminate the pain and the tendency to ulceration, by variations in the

method of injection and the addition of different substances to the oil.

Case notes and photographs of a few of our cases before, during and after treatment are appended to give some indication of our results up to the present. Later, it is hoped to give a fuller account of the work.

Case 1.—Male, æt. 14 years: duration of leucoderma one year. Had external application of bouchi oil and intestinal antiseptics from September 1938 to April 1939 with no signs of improvement (figure 1a). One injection of oil was given on 19th April and another on 24th May. Pigment began to appear very soon and in three months the condition was as shown in figure 1b.

Case 2.—Male, æt. 3½ years: duration of leucoderma eight months. Had external application of bouchi oil and intestinal antiseptics from October 1938 to April 1939 with no improvement (figure 2a). Injections were given on 10th May and 24th May in various places. The pigment began to appear after the first course of injections and this increased after the second course. The condition in August 1929 is shown in figure 2b. Two more lots of injections were given on 20th August and 9th September, and the condition in November 1939 is shown in figure 2c.

Case 3.—Male, at. 8 years: duration of leucodermanine months. No external applications or other preliminary treatment was used in this case. Injections began on 28th January, 1939; no photograph was taken at this time. Pigmentation began after first injections and figure 3a shows the condition in March 1939. Two further series of injections were given on the 8th and 15th March and figure 3b shows the condition in May. No more injections were given but the deposition of new pigment continued as is shown by figure 3c, taken in August 1939. (The source and intensity of the lighting is unfortunately varied in these three photographs.)

Case 4.—Female, æt. 22 years: duration of leucoderma five years. Had external application of bouchi for about two months (March and April 1939) with no signs of improvement (figure 4a). The oil was infiltrated around the margins instead of being scattered over the whole area of the white patches. After two such courses of injection in May improvement was noticeable and figure 4b shows the condition in August 1939. This patient is still attending but is most irregular, often staying away for months at a time. Nevertheless she has had two further courses of injections since August last year, and she is showing steady improvement, but it has not been possible to get another photograph.

Case 4 is of particular interest, because of the long duration of the leucoderma before treatment was begun. Our experience with the old form of treatment was that leucoderma of five or more years' duration was practically always incurable, but in this woman the regeneration of pigment began just as soon and proceeded just as rapidly as in those in whom it had existed for much shorter periods.

## A Mirror of Hospital Practice

#### GENERAL TRANSPOSITION OF ORGANS

By Rai Bahadur CHHAGAN NATH
Assistant Surgeon, Medical Officer In-Charge,
Lansdowne Hospital, Udaipur

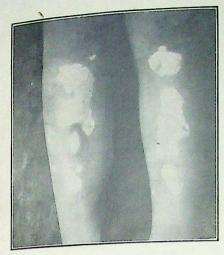
A PATIENT aged 40 years was admitted to the Lansdowne Hospital on 6th May, 1939, complaining of a hard swelling in the right hypochondriac region, together with generalized pain and discomfort. He also complained of weakness and irregular fever off and on.

Family history.—The patient has one brother and two sisters, all healthy. He has six sons and daughters, all living and healthy. The patient moderately addicted to tobacco smoking and alcoholdrinking.

No history of venereal disease.

Previous history.—The patient has suffered from malaria fever off and on.

PLATE III
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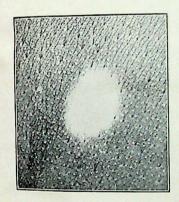
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Fig. 2a.

Fig. 2b.

Fig. 2c.





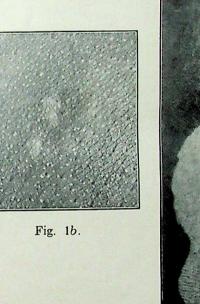


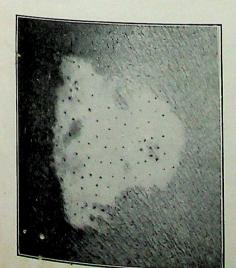




Fig. 1a.

Fig. 4a.

Fig. 4b.



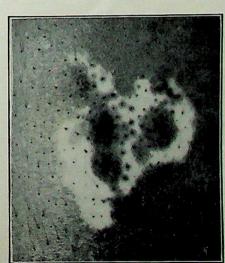




Fig. 3a.

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Fig. 3c.

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Present history.—Two years ago, the patient suffered from fever with rigor for a fortnight and subsequently from fever with rigor for a fortnight and subsequently he noticed a hard swelling in the abdomen on the right side. Fever subsided and the swelling was much reduced. For the last six months he again had reduced fever and the swelling has again increased.

On examination a hard mass was palpable in the right hypochondriac region reaching below the level of right hypochondriac region reaching below the level of the umbilicus. The upper surface was smooth, was felt below the costal margin, and definitely moved with the respiration. It was thought to be a case of enlarged liver and he was admitted into the hospital.

On subsequent examination after admission the following conditions were found-

(a) The swelling on the right side was typical of a spleen with a notch on the inner surface.

(b) Liver was found on the left side—normal

in size. (c) Heart sounds were missing on the left side, but on further examination it was found that they were present on the right side with the apex in the 5th right intercostal space three and half inches from the middle line. The cardiac dullness was also normal in size.

The patient was treated as an ordinary malaria case. The swelling became reduced in size and he left the hospital.

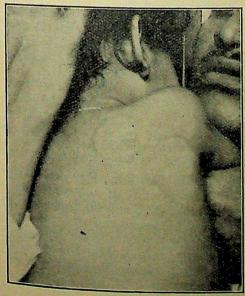
#### EPIDERMOPHYTOSIS IN A VERY YOUNG CHILD

By L. M. GHOSH, M.B., D.T.M.

P. A. MAPLESTONE, D.S.O., D.SC., M.B., B.S., D.T.M. (From the Medical Mycology Inquiry, School of Tropical Medicine, Calcutta. Under the Indian Research Fund Association)

A HINDU girl, aged seven months, was brought to the out-patients department of the Calcutta School of Tropical Medicine, recently, for treatment of a skin condition.

The child had two ring-shaped patches on the back of the right shoulder. One patch was almost exactly



circular and about one and a half inches in diameter and the other slightly larger and irregular in outline extending to the posterior fold of the axilla (see figure).

Both patches exhibited relised margins composed of minute vesicles and they, encircled areas of skin covered with fine scales; it other words they exhibited the typical appearance of lesions caused by an epidermophyton. Cultures from the scales confirmed the diagnosis because Epidermophyton floccosum (E. cruris) was isolated. Careful examination of the child's head failed to reveal any sign of trichophyton infection, and it was learned that the brother, who habitually carried his sister in his arms, had a ringworm infection of the body, which was the probable source of the child's disease.

Discussion.—None of the many standard works on dermatology available to us give any information on the age incidence of E. floccosum infection, but it is generally understood that young children are not affected by this fungus. As an instance of what may be taken as the opinion of dermatologists in general, Macleod (1933) says that Tinea circinata is essentially a disease of children and that the causative organism is a trichophyton spreading from the scalp. Further, our experience in Calcutta extending over more than fifteen years, during which period the annual average of new cases of ringworm of the glabrous skin was over 1,500, has been that no case has ever been seen before under ten years of age and the majority of them are adults. These facts emphasize the interest of the above record.

#### REFERENCE

Macleod, J. M. H. (1933). Diseases of the Skin. H. K. Lewis and Co., London.

#### A HYDATID CYST IN THE NECK

By HUKAM CHANDRA, M.B., B.S., P.C.M.S. Assistant Surgeon, In-charge Civil Hospital, Mailsi, District Multan, Punjab

THE patient, an Indian Muslim male child aged 6 years, son of a weaver, was admitted into hospital on 9th October, 1939.

History.—Painless enlargement on left side of the neck; duration six months, causing no symptoms except slight inconvenience during mastication, yawning, etc., for the last six weeks or so. Past and family history nothing particular.

Examination.-An oval well-defined swelling with the long axis vertical extending from just below the ear to the supraclavicular fossa on the left side of the neck and measuring 3½ inches by 1½ inches. Outline smooth and regular, except at the lower pole where two almond-shaped cystic swellings distinct from each other and from the main tumour could be felt. The tumour was immobile but free from any adhesions to the overlying skin and was not tender to manipulation the overlying skin and was not tender to manipulation. Fluctuation was easily elicited but no fremitus or thrill was felt. Transillumination did not help. No enlargement of lymphatic glands in the neck, axillæ or groins was present. Physical examination of the rest of the body revealed nothing special. Liver and spleen were normal in size: no evidence of anemia but differential count showed 6 per cent eosinophil cells; temperature was within normal limits; tongue clean and moist; oral hygiene satisfactory and appetite good; urine clear and stools normal; the general health of the boy was above the average.

Operation was performed on 11th October, 1939, under chloroform anæsthesia. The tumour was found beneath the sternomastoid muscle, the upper pole being under

the parotid gland. The catocyst was thin and firmly adherent to the carotid sheath. The cyst was enucleated easily with practically no bleeding. The fluid was slightly opalescent, specific gravity 1,008 with a trace of albumin, and characteristic hooklets were observed microscopically. The two cysts at the lower pole were separate from the bigger one with no general cyst wall. The wound healed by first intention and the patient was discharged on the 27th October, 1939.

The point of interest is the rarity of the

condition in such a site.

I am grateful to Major S. Smythe, I.M.S., Civil Surgeon, Multan, for his permission to publish the report of this case.

#### ACUTE OBSTRUCTION CAUSED BY MECKEL'S DIVERTICULUM

By NAZIR AHMED BHUTTA, M.B., B.S., P.M.S. Assistant Surgeon, In-charge Civil Hospital, Dera Ismail Khan, N.-W. F. P.

History.—A foot constable, aged 29 years, attached to a police station about 20 miles from headquarters reported sick to the dispensary doctor on the morning of 14th October, 1939. He gave him an enema and fomentations on the abdomen as he complained of pain in the abdomen and constipation with no passage of flatus for the last 24 hours. The man passed some

fomentations on the abdomen as he complained of pain in the abdomen and constipation with no passage of flatus for the last 24 hours. The man passed some fæcal matter but no flatus and pain was not relieved. He was kept in the local hospital for more than 36 hours and then at 4 a.m. on 15th October was transferred to the police hospital from where he was sent to the civil hospital as an emergency case, at 9 a.m. the same day. He complained of severe irregular pain in the lower half of the abdomen, no passage of flatus or stools (except the small one in hospital) for three days, and vomiting.

He lay curled up in the bed, with thighs flexed and he had rapid thoracic type of breathing, pinched facies, coated, furred, dry tongue, temperature 99°F., and pulse 100 per minute. He vomited once on arrival but it was not fæcal in character. Abdomen was tympanitic and no tumour was felt. There was no tenderness over McBurney's point, but there was deep-seated pain on pressure in the mid-line below the umbilicus. A gurgling noise was only occasionally heard with the stethoscope. There was no ladder-like appearance of the abdomen so typical in acute obstruction. Hernial sites were normal. Rectal examination revealed nothing of importance. A provisional diagnosis of 'acute abdomen' with obstruction and possible early peritonitis was made.

Atropine sulphas gr. 1/75 was given hypodermically

was made.

Atropine sulphas gr. 1/75 was given hypodermically and patient prepared for immediate operation, as palliative measures had previously been tried in the police hospital and rural dispensary and failed. Under general anæsthesia by chloroform the abdomen was opened by a para-rectal incision and explored. Purulent free fluid was present and the intestines were covered with exudate; the lower coils of the ileum were found tightly strangled by what appeared to be an unusually long appendix, but further search showed the appendix

to be quite distinct and perfectly healthy.

The strangulating band (as it appeared at first) was encircling two coils of the intestine which were doubled up. On one side, which was thin, it was attached to up. On one side, which was thin, it was attached to a cord-like peritoneal band connecting it with the abdominal wall; this was the cause of obstruction. On cutting this band it was found to be a Meckel's diverticulum very much stretched and gangrenous. After untying the knot in the diverticulum, in which considerable trouble was experienced to avoid bursting it, the obstructed coils returned to normal colour after a few minutes' fomentation with saline. The proximal end of the diverticular attachment to the intestine was crushed with long artery forceps, cut and invaginated inside the gut by purse-stringe sutures, after application of carbolic acid

Then after the usual peritoneal toilet the abdomen was closed in layers and a drainage tube was put in reaching down to the pelvic cavity.

The patient afterwards was put on fluids by mouth

The patient afterwards was purely and rectum, and placed in Fowler's position.

Not more than 20 c.cm. of anti-gas-gangrene serum and antiperitonitis serum was available. He was very and hypergine hypergeneral property and restless in the afternoon and hyoscine hypodermically had to be administered at night and bromide was put in the rectal saline, but he was still uncomfortable that night and the abdomen became distended. On the following day pitressin (P. D. and Co.) 1 c.m. hypodermically every four hours was started and an enema of glycerine was given. This day he was again uncomfortable but at night he passed some flatus. On the 17th morning he passed a good motion and a large amount of flatus and henceforward he progressed and made an uneventful recovery except for a stitch abscess.

#### M. AND B. 693 IN A CASE OF PNEUMONIA COMPLICATING A CASE OF WOUND OF ABDOMEN

By NAZIR AHMED BHUTTA, M.B., B.S., P.M.S. Assistant Surgeon, In-charge Civil Hospital, Dera Ismail Khan, N.-W. F. P.

History.—Male, aged 20 years, agriculturist was stabbed at about 8 a.m. on 25th November, 1939, by a person who ran amuck. He was picked up by the

police and sent to the hospital.

On examination it was found that he was stabbed in the left anterior axillary line below the costal margin with omentum and small intestine protruding about 9 inches. Pulse 78, respiration 26, temperature 98°F. There were three punctures in the intestine. No injury to the chest was found. After adopting anti-shock measures, a laparotomy with paramedian incision and excision of protruding omentum, suturing of punctures and exploration of abdomen was done. The routine post-operative treatment for laparotomy was adopted and the following morning it was noticed that the patient was spitting blood-stained rusty sputum and had hurried respiration (42 per minute). His temperature was 100°F and pulse 128 and he passed a motion and was 100°F. and pulse 128 and he passed a motion and The lungs were examined and a few râles were flatus. The lungs were examined and a lew rates found in the left chest. Antiphlogistine was applied and the pneumonia mixture of the hospital given. In and the pneumonia mixture of the hospital given. In the evening his condition rapidly became worse, temperature 102°F., pulse 136, respiration 56 and general condition very bad. Examination showed definite consolidation of the left base. The cause of pneumonia was either exposure in the village after the injury in a condition of papie, the anæsthetic of injury in a condition of panic, the anæsthetic of because the injury was near the left diaphragm. Immediately he was put on M. and B. 693 by the method advised in the wrapper, antiphlogistine was applied and expectorants and glucose water given. applied and expectorants and glucose water given.

I never expected him to live to the next day.

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respiration next morning was remarkably changed respiration much easier, pulse also fuller and steadier. It came down to normal within 36 hours of commencing M. and B. 693. But the lung condition showed not much change and respiration remained up to 32 per minute for six days. He made an uneventful recovery. condition next morning was remarkably

In the Lady Reading Provincial Hospital Peshawar, stab wounds of the abdomen are so common that in 1937 about 90 laparotomies were done because of them, and this complication (pneumonia) was presumably in many cases the cause of fatality rather than the original stab. It might possibly make some difference in the results of such controlled results of such cases if M. and B. 693 is used.

My thanks are due to Lieut.-Col. A. Sahibzada, I.M.S., civil surgeon, for permission publish this report

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## Indian Medical Gazette

### FEBRUARY

## THE TRANSMISSION OF KALA-AZAR

KALA-AZAR is a disease that has existed in India for at least a hundred years. earlier history is obscured by the fact that, in the days before the parasitic origin of disease was established, it was not unnaturally confused with other diseases in which fever and splenic enlargement were prominent symptoms, for example, malaria. However, the shrewd clinicians of seventy years ago, even before Laveran had demonstrated the malaria parasite, recognized kala-azar as a separate clinical entity, though it was not until the beginning of the present century that the causative organism was discovered. The next problem for the sanitarian—as distinct from the physician, for the latter was at that time faced with the heart-breaking problem of attempting to cure a disease that was almost invariably fatal whatever line of treatment was adoptedwas to discover how the disease was acquired. A great deal of scientific attention was focussed on this problem, as kala-azar had for many years the distinction of being the only important tropical disease whose mode of transmission was not known. Such problems are not solved in the laboratory, as is popularly imagined, but in the field, for it is only by observing the conditions under which a disease is acquired, and the habits and mode of living of the people who suffer from it, that the first clues to the solution are found; kala-azar proved to be no exception.

It was apparent from the earliest days of observation that kala-azar was 'infectious'; it was a 'family' and a 'house' disease, and in the areas where it was epidemic the first cases in a village could often be traced to the arrival of a person suffering from kala-azar. Yet, whilst kala-azar seemed to spread from village to village in some areas, where certain physiographical and climatic conditions prevailed, it did not behave like many infectious diseases and spread from province to province and country to country; it did not, for example, spread to high altitudes, nor did it desert the alluming to high altitudes. alluvial plains of the Ganges valley and climb to the adjacent laterite plateau, though the people are of the same race and caste and the living conditions in the two areas closely resemble one another, and though there is repeated interchange of population. These distinctive traits of the disease disease made it difficult to believe that transmission from man to man was a direct one such as occurred man to man was a direct one such as occurs in the case of bowel infections, like cholera, dysentery or typhoid, from excretory

contamination of food or water, and in respiratory diseases, such as the common cold or influenza, by droplet distribution from the respiratory tract; they suggested rather that the transmission of this disease is a more complicated biological process that can only occur in especially favourable circumstances. transmission is such a process, and, as this is a method by which many diseases are known to be transmitted, it is very natural that the possibility that kala-azar also is transmitted in this way should have been envisaged.

Kala-azar is essentially a disease of rural areas, and, though it does occur in towns, the incidence is never as high; this is significant in view of the fact that large numbers of people densely packed together would form very suitable material for a conflagration, were the infection and the means of transmission from one person to another both present. It was observed that although there were in Calcutta innumerable people suffering from kala-azar who, in order to obtain treatment, had come in from the country districts round Calcutta, where the disease is very prevalent, the disease did not appear to spread except in one particular quarter, and this was not the most congested quarter of the town. This observation appeared to provide an excellent opportunity for studying conditions favourable to the transmission of kala-azar, with a control area nearby in which they were not favourable. There were obvious advantages in undertaking investigations in a circumscribed area where special conditions prevailed and where the flora and fauna, though numerous and varied, did not present to the investigator, who wished for example to take a census of the blood-sucking insects, the almost hopeless task that he would have had to face in the rural endemic areas. The constant presence of the parasite of kala-azar in the blood of the patient seemed to suggest the possibility that the parasite left the body by way of the peripheral blood, and in this connection the ubiquitous bed-bug had come under suspicion, but vis-à-vis the unusual epidemiology of the disease, its very ubiquity excluded it.

The sand-fly (phlebotomus) had already been incriminated in connection with the transmission of oriental sore—another leishmanial infection and this genus was amongst the first to receive special attention; three species of phlebotomus were found in Calcutta, Phlebotomus minutus, P. papatasii, and P. argentipes. The first species is a common one but is almost entirely a non-mammalian-blood feeder; the second is rare and found only at certain seasons of the year; but the third one was not only found in large numbers but was far commoner in the endemic than in the control area.

The next stages in the investigation were undertaken in the hospital and laboratory. Although at this stage no infected sand-flies were found in nature (later, infected wild sand-flies were found on many occasions), it was shown by serological testing of the blood meal of sand-flies that, in the absence of cattle, P. argentipes was a persistent human-blood feeder and that most of the flies of this species caught in the endemic area contained human blood. It was also found that laboratory-bred P. papatasii fed readily on man but P. minutus would not; the first experiments were therefore conducted with the two former species, and it was found that in a large percentage—over 40 per cent in the first experiments—of P. argentipes fed on kala-azar patients the parasite developed into the herpetomonas stage and caused a heavy flagellate infection in this sand-fly, whereas in P. papatasii only two per cent developed a light infection.

It was further shown that, when these flies were kept alive for about seven days after the infecting feed, they developed a heavy infection which tended to move forward to the anterior parts of the fly and eventually to form a large plug of flagellates in the buccal cavity. The successful march of these investigations was now checked, for experiments to transmit kala-azar by feeding infected flies on susceptible animals and on human volunteers all failed; later, however, in experiments conducted by two different groups of workers the infection was transmitted to several hamsters, but only after a very large number of negative experiments. All attempts to transmit the disease to human volunteers were unsuccessful, but this was not very surprising in view of the fact that man enjoys a natural resistance to the infection, which infection probably only establishes itself under special circumstances.

In the meanwhile, in other countries where kala-azar is endemic, China and Italy, for example, these observations of the workers in India were confirmed and it was shown wherever investigations were carried out that sand-flies of allied species capable of carrying the infection were to be found. In China, a slight diversion was caused by the observation that viable parasites could often be recovered from the nasal mucosa of kala-azar patients and the suggestion that the infection might be transmitted directly from person to person was again revived; however, the known epidemiological facts were so directly opposed to this theory that it could not be entertained seriously. Other observations were made, none of which proved, but all of which added support to, the sand-fly theory of transmission: the case for the sand-fly, P. argentipes and allied species, is well summarized in the following quotation from a recent publication:—'So far as India is concerned, every epidemiological observation fits in with the sand-fly hypothesis of transmission. Further, this sand-fly has actually been found in large numbers in every locality where kala-azar occurs; it is a persistent human-blood feeder; a large percentage of the flies that feed on an infected person acquire the infection; infected

flies have been found repeatedly in nature—this is not true of other sand-flies which are more prevalent in the non-endemic areas, nor of insects of any other genus so far experimented with; in this fly anterior development of the flagellate infection occurs and is unlikely to be purposeless—in natural flagellate infections which pass from insect to insect the development is usually posterior; and it has been shown experimentally that the fly is capable of transmitting the infection to a mammalian host by its bite. All these facts make it almost certain that this insect is an important agent in the transmission of the disease from man to man in nature, although it may not be the only agent'.

This then was the position about five years ago, and, as we appeared to be in an interepidemic period, research work on the transmission problem in India was virtually closed down, but, as during recent years there has been some evidence of a general increase in kala-azar in India, the nucleus enquiry was strengthened last year and work again commenced in a new locality where kala-azar was said to be increasing.

Elsewhere in this number will be found a paper reporting a distinct advance in the transmission problem. Hitherto in these experiments, sand-flies have been kept alive after their infective feeds on kala-azar patients by successive feeds on experimental animals, but now a technique has been devised for keeping the sandflies alive by feeding them on fruit juice. It has been found that flies fed by this means live longer, and, further, that the flagellate infection in these flies develops more rapidly until the anterior part of the alimentary tract becomes so completely blocked that the fly is incapable of taking a blood meal, even though it buries its proboscis into the skin and makes violent attempts to withdraw blood. It seems inevitable that this violent muscular effort on the part of a 'blocked' fly to take a blood meal must lead to the dislodgement of some part of the plug of flagellates, which would then find its way into the wound.

Heavy infection of a sand-fly was reported in the earlier investigations, and this mechanism of transmission was suggested, but the recent investigations have shown how these heavy infections can be produced with considerable regularity in circumstances which will frequently be reproduced in nature. Finally, the few transmission experiments with hamsters that have been carried out since this observation was made have shown a much higher proportion of successes than has been achieved hitherto.

Whilst it cannot be claimed that these new observations have proved the sand-fly theory of transmission, or even that they have carried the investigations through another stage, they have explained certain apparent anomalies and have added considerable support to a theory which has already been accorded general acceptance.

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## Special Articles

HÆMATOLOGICAL TECHNIQUE

PART I

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and

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ANAMIA is attracting more and more attention each year in India. Also it is being realized that accurate methods of blood examination are essential for the proper study of a case of anæmia. Many books on laboratory technique give full details of the methods that can be adopted, but such books are not always easily available to practitioners: further, the methods described in these books are often embarrassing in their multiplicity. We feel that readers of this journal, particularly those working in India, might find a short description of the methods followed at the Calcutta School of Tropical Medicine useful, and we have therefore prepared a series of short notes on hæmatological technique, which we propose to publish in successive numbers of this journal.

#### (1) The Collection of the blood sample

The first essential is that one constant practice should be decided upon and followed. There is a difference between capillary, which for all practical purposes is arterial, and venous blood, but the difference is only of practical importance if two samples from the same individual at different times are to be compared, or when normal standards are being worked out.

As there are very distinct advantages in the use of venous rather than capillary blood, the former is preferred.

The advantages are that all the examinations, e.g., the estimation of hæmoglobin, the determination of cell volume, the total red and white cell counts, the reticulocyte count, the differential white cell count, the measuring of the red cell diameters, the icterus index, the van den Bergh reaction, the fragility test, the erythrocyte sedimentation test, etc., can all be done from a single sample of blood obtained by a single puncture. Further, the tests can be repeated by the same or by different workers from the same sample of blood.

For some of the tests, the van den Bergh test, for example, blood will have to be taken from the vein, so that sufficient might as well be taken at one time for all the tests and the patient and anamic individuals, it is sometimes difficult

to draw enough blood from a finger or ear lobe without squeezing the part, and thereby diluting the blood with the tissue fluid.

The following rules should be observed when

using venous blood:-

- (a) The syringe should be air-tight and perfectly dry. The syringe is conveniently dried by first washing it thoroughly in clean water, removing the water with alcohol, removing the alcohol with ether, and finally drawing air through it. If there be even a trace of water or alcohol, there will be hæmolysis of the blood, and this will make it unsuitable for examination.
- (b) The tourniquet should not be kept tied for more than two minutes when drawing the blood from the vein, as the red cell count begins to increase after 3 minutes stasis.
- (c) The needle of the syringe should be removed before the blood is put into the flask, as hæmolysis may result if the blood is forced through the needle.
- (d) The flask should always be kept closed with a rubber cork; cotton wool should never be used. The flask should be shaken at once vigorously, to ensure complete solution of the oxalate powder.
- (e) The blood should always be mixed thoroughly for at least 3 minutes, preferably in a shaking machine, before any sample is withdrawn from it. The blood should always be taken directly from the flask and not from blood poured out on to a slide or watch glass.
- (f) The flask must be kept corked at all times when not in use.

Time for collection of blood.—When repeated examination is required, blood should always be collected at the same hour under basal conditions in the morning. Even for a single examination it is preferable to collect the blood in the morning under basal conditions; this precaution will minimize the effect of the fluctuations in the total and differential count due to muscular activity.

Procedure.—The blood is drawn from one of the prominent superficial veins at the bend of the elbow in a perfectly dry air-tight syringe.

First of all, smears for the differential leucocyte count and red-cell diameter measurements should be made\*; then a measured amount of blood is transferred to a small 25 c.cm. Erlenmeyer flask containing the requisite amount of anti-coagulant for that quantity of blood.

Anti-coagulant.—Two milligrammes of dry oxalate powder is required for each cubic centimetre of blood. A mixture of potassium and ammonium oxalate powder in the proportion of 2 to 3 has been found to be ideal, as, in the above proportion, the shrinkage caused by potassium oxalate is counteracted

<sup>\*</sup> As stated above this can be done from the oxalated sample, but it is better to make separate smears.

by ammonium oxalate (Wintrobe and Landsberg, 1935). To measure the requisite amount of the oxalate powders make a 1 per cent solution of the two oxalate powders, ammonium and potassium; accurately measure with a pipette 0.4 c.cm. of the potassium salt and 0.6 c.cm. of the ammonium salt, and put them into the flask; evaporate in a dry oven, after which the oxalate will be found at the bottom of the flask in a powdered state; this is the amount required for 5 c.cm. of blood; for 3 c.cm. the proportions will be 0.24 c.cm. potassium and 0.36 c.cm. ammonium salt. The flasks are now kept corked and are ready for use.

It is a good practice to have two sets of flasks prepared containing enough anti-coagulant for

5. c.cm. and 3. c.cm., repectively.

If potassium oxalate alone is used, 2 milligrammes are required for each cubic centimetre of blood, that is, 10 milligrammes or 1 c.cm. of one per cent solution for each 5 c.cm. of blood. If potassium oxalate only is used, Wintrobe's correcting factor × 1.09 must be applied to compensate for shrinkage.

Time limits.—Osgood and others (1931) give the following time limits for different examina-

Hæmoglobin estimation, red cell count, white cell count, and reticulocyte count-24 hours.

Icterus index and van den Bergh test-2 hours. Cell volume, fragility test, and sedimentation rate—3 hours.

Making smears for differential count-1 hour.

#### (2) Estimation of hæmoglobin

To estimate the amount of hæmoglobin in any sample of blood advantage is taken of certain properties of hæmoglobin. Of these the most important is its oxygen-carrying capacity. A fixed amount of hæmoglobin will always combine with the same amount of oxygen, actually 1 gramme of hæmoglobin with 1.34 c.cm. of oxygen: the amount of oxygen that will combine with a sample of blood can be measured accurately and the hæmoglobin content of the sample thus estimated.

Another property is its iron content. Hæmoglobin has a known chemical formula in which there is one atom of iron, so that by estimating the amount of iron in the red cells from a given volume of blood it is possible to calculate the amount of hæmoglobin in the sample.

Hæmoglobin is a protein with a known refractometric index. By measuring this index it is possible to calculate the amount of hæmoglobin in any sample.

Yet another property of hæmoglobin is its colour and this can be measured in the various ways indicated below.

Whilst the property of hæmoglobin easiest to measure is its colour, the most fundamentally

important property is its oxygen-carrying capacity. There is evidence that these two properties are very closely correlated, so that if an instrument which measures the colour is first calibrated by the oxygen-carrying method a very close approximation of the hæmoglobin content of a sample can be obtained by the former method.

Most clinical hæmoglobinometers that are now sold are thus calibrated.

Clinical methods of estimating hamoglobin. Of the many methods of estimating hæmoglobin that are in use, none of the simpler methods is above criticism, while the more accurate procedures, e.g., van Slyke's oxygen-carrying-capacity method, are hardly suitable for general clinical practice. Most of the clinical procedures in common use are methods of measuring the colour of the hæmoglobin and are based on one or other of the following principles:-

I. Direct comparison of the colour of undiluted blood against a graduated colour standard.

(a) On special blotting-paper (Tallqvist).

(b) Between glass-plates (Dare).

II. Comparison of blood diluted to a fixed percentage against a graduated colour standard.

- (a) Diluted with sodium carbonate solution and compared with a coloured-glass wedge (Fleischl-Miescher).
- (b) Diluted with deci-normal hydrochloric acid and compared with a coloured-glass wedge (Hellige-Neoplan).

III. Comparison of blood diluted to a varying degree with a fixed colour standard.

(a) Diluted with water and compared to a permanent picrocarmine standard (Gowers).

(b) Brought into contact with carbon monoxide, diluted with water, and compared with a permanent colour standard (Haldane).

(c) Diluted with deci-normal hydrochloric acid and compared with a permanent standard of acid hæmatin (Sahli), or a coloured glass block (Hellige).

IV. Comparison of blood diluted with decinormal hydrochloric acid to a fixed percentage against a fixed colour standard in a colorimeter of the Duboscq type.

(a) Water placed in one chamber of the colorimeter and a standard coloured disc inter-

posed (Newcomer).

(b) Compared with an acid hæmatin solution of known strength.

Other methods which require more elaborate instruments depend on the intensity rather than the colour of the light transmitted through hæmoglobin solutions; this is measured by means of a photo-electric cell.

In the writers' laboratory the new Hellige 'normal hæmometer' is used for all clinical purposes. The great advantage in the Hellige instrument is that it is possible to match the FEB., 1940]

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Hellige clinical Hellige atch the brown-coloured acidulated blood solution with brown-coloured and exactly, and, as the standard the coloured glass it the colour sound glass, it is unlikely to is made of colour change; one colour days is made any colour change; one coloured prism which has been in use in our laboratory for more which has years has not undergone any colour than four years has not undergone any colour change during this period. The sources of error, excluding those of carelessness in technique, using dirty pipettes, etc., will arise through variations in the diluting pipettes and in the calibres of the graduated tubes. The method suffers the disadvantage that with each dilution only one reading can be made—a second observer can check the reading, but not make an independent one and that a time interval of fifteen to twenty minutes must be allowed before reading the result.

Methods of expressing the results.—The amount of hæmoglobin in an individual's blood may be expressed-

hæmoglobin in terms of a percentage of an unknown and arbitrary standard, and to adopt the first and express results in terms of grammes of dry hæmoglobin per 100 c.cm. of blood.

Instrument makers, who have hitherto made no attempt to adopt a universal standard, and hæmatologists, who have not encouraged them to do so, are both responsible for the present unsatisfactory state of affairs.

The confusion that exists cannot be better examplified than by the table (I) below which shows that not only are there differences in the standard between instruments of various makes, but instruments of the same name made at different times vary from one another, and finally various authorities give different figures for apparently the same instruments.

However, many instruments that are now sold give the readings in terms of grammes of hæmoglobin per 100 c.cm. of blood; others give readings

TABLE I Amounts of hamoglobin per 100 c.cm. of blood which are shown as 100 per cent by different instruments

Authority	Tallqvist	Sahli	Dare	Newcomer	Haldane	Fleischl- Miescher
Pepper and Farley, 1933  Nicholson, 1934  Whitby and Britton, 1939  Kracke and Garver, 1937	13.8 15.8• 13.8 15.8	17.3 17.2 (old) 14.5 (new) 17.3 (old) 17.3 (old) 13.8 (new)	13.77 (old) 16.9 (new) 13.8 15.9 13.77	16.9 16.9	13.8	15.8
Levinson and MacFate, 1937 Ordway, Gorham and Issacs, 1937. Beck, 1938	15.8 15.8 13.8	17.3 13.8 * to 17.2 13.8 * to 17.3	16.0 13.7 to 16.0 13.7 * to 16.9	15.92 16.9 16.9	13.8	15.8

<sup>\*</sup> Different instruments are supplied with different standards.

(i) As the number of grammes per 100 c.cm. of blood, or (ii) as the percentage of the amount present in the blood of the 'normal' individual.

The disadvantage in the latter method is that there is no uniformity of opinion as to what is a 'normal' individual. Figures for the normal' given by different writers vary from 13.8 to 17.3 grammes, and in our personal experience we have found amongst groups of so-called healthy coolies in Assam a figure lower than the former, and amongst healthy Europeans in India one higher than the latter. If the expression '100 per cent hæmoglobin' has any meaning at all it may be that the particular meaning at all, it must imply that the particular sample is what one would expect from that individual if he were in perfect health. This would mean that a different standard would have to be adopted for each class of individual, a procedure which would lead to endless confusion the sion. It is therefore better to abandon the second method, namely, that of giving the in duplicate so that it is easy to see what corresponds to 100 per cent, or, if they use the older method, they state what their 100 per cent corresponds to in terms of dry hæmoglobin.

The excuse given for adhering to the older method (ii) is that most practitioners are familiar with this method of expressing the hæmoglobin. It may be true that they are familiar with the expression, say, 'hæmoglobin 80 per cent', but they don't know what it means, for it may mean anything between 11 and 13.8 grammes of hæmoglobin per 100 c.cm. of blood, a discrepancy which is far from negligible. They must therefore learn something new, so why should they not learn a new method which has a definite meaning accepted by all hæmatologists. Most American medical books are now using the 'new nomenclature' and in Great Britain the more conservative clinicians will follow the lead already given by British hæmatologist, in course of time.

A table (II), showing the 'normal' hæmoglobin levels in different populations in India with a few samples from other countries for comparison, is given below:— are the coloured prisms in the front and an opaque glass plate at the back. Through a hole in the housing the mixing tube is introduced and lies at the

Table II
'Normal' hamoglobin levels of different populations

Sex	Age	Locality	Economic status	Hæmoglobin in grammes per 100 c.cm.	Standard deviation	Number on which based	Authority
Males	19-30 25-45	Bombay Calcutta	Students Mixed, servants.	15.37 14.77	± 0.96 ± 1.36	121 50	Sokhey et al., 1937. Napier and Das Gupta, 1935a.
	25-45	,,	Clerks and	15.70	$\pm 0.91$	30	,, ,, ,, 1936.
	Adults " " " " "	Assam Cachar Assam Shivrajpur U. S. A. Britain	doctors. Coolies  "  { "	12.63 12.60 11.83 13.74 12.95 16.00 15.60	± 1.41 ± 1.83 ± 1.67 ± 1.79 ± 1.72	20 25 24 47 49	Napier and Majumdar, 1938. Napier and Das Gupta, 1935b. Sen (Napier, 1939). "( ", "). Castle and Minot, 1936. Whitby and Britton, 1939.
Females	18-30 14-38 17-22 17-30	Bombay Calcutta Madras Delhi Coonoor	Middle class Students Middle class	14.50 12.99 12.63 13.73 13.11 15.81	$\pm 1.10$ $\pm 1.01$ $\pm 0.93$ $\pm 0.81$ $\pm 2.54$	101 128 62 100 100	Price-Jones, 1931. Sokhey et al., 1938. Napier, 1939. Sankaran and Rajagopal, 1938. Benjamin, 1939. Radhakrishna Rao, 1938.
	Child bearing.	(6,000 feet). Cachar Assam Britain Michigan	Coolies Students	10.40 10.80 13.60 13.70 13.76	± 1.74 ± 2.30	25 20  50	Napier and Majumdar, 1938. Napier and Bilimoria, 1937. Price-Jones, 1931. Whitby and Britton, 1939. Bethell, 1936.

Hellige normal hæmometer

The instrument consists of the following parts:—

- (i) A mixing tube with graduations from 10 to 170 (see figure, A).
- (ii) A pipette with a mark at 20 c.mm. capacity (B).

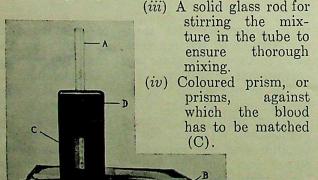


Fig.—Hellige normal hæmometer.

(v) The housing of the hæmometer (D) which is made of steel with a large base to ensure safe standing. Inside the housing

same distance from the eye as the prism.

Technique.—Fill the graduated measuring tube up to mark 10 (using a large pipette) with N/10 hydrochloric acid.

After shaking the blood in the flask for three minutes, with the pipette draw up the blood to the 20 c.cm. mark exactly, wipe away any blood adhering to the outside of the pipette, and transfer the blood into the measuring tube. If the blood goes a little beyond the mark, it is brought back to the mark by touching one's finger with the tip of the pipette a few times.

By repeated filling and emptying the pipette should be completely freed from all vestiges of blood, and the blood should be intimately mixed with the hydrochloric acid; the red hæmoglobin now turns to acid hæmatin (brown).

Wait for fifteen to twenty minutes; the mixture which is now brown should be perfectly clear.

Now add water slowly drop by drop with a pipette, mixing constantly with the solid glass rod, until the mixture matches exactly the colour of the standard prism C in the housing. During the process the solid rod should not be placed on the table, as each time it is allowed to touch anything the small amount of mixture adhering to the rod will be lost, and this source of error will be multiplied.

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To match the solution and the standard, the hæmometer should be held up to a good source hæmometet natural light, direct sun-light and or man light being avoided. The level in the artificial light opposite the lowest point of the mixing and the diluted acid hæmatin is read; this gives the percentage of hæmoglobin. The end point is generally very sharp and there is seldom any difficulty in matching the solution and standards exactly, except with leukæmic and jaundiced blood. When a point is reached at which the solution appears to match the standards, take a reading; then add a drop of water, mix the solution, hold up to the light and take a second reading. If at the second reading the solution is definitely too light the first reading should be taken. On the other hand if the second reading still appears to match the standards, but, after yet another drop has been added, the solution is definitely lighter than the standards, the result should be the mean of the first two readings.

The present writers, Napier and Das Gupta (1935), calculated that 100 per cent with the Hellige normal hæmometer represented 13.67 gramme by the refractometer method, but later by means of the van Slyke oxygen-carrying method a slightly higher figure was obtained and they decided to consider 100 per cent as 13.75

grammes.

Other instruments of this pattern (Hellige normal hæmometer) that they have used have not differed appreciably from this standard, but it is advisable to have the colour standard with the pipettes and mixing tubes to be used, tested in some laboratory where the van Slyke oxygencarrying method is also employed.

The reading in terms of percentage from the tube must be converted into grammes; this can be done conveniently by using the conversion table of which the skeleton is given below (table III). It is recommended that the full table be

prepared and kept handy.

#### TABLE III

Skeleton table of hæmoglobin values of the Hellige normal hæmometer converted into grammes of hæmoglobin per 100 c.cm. of blood

Per cent	Grammes	Per cent	Grammes
Hellige	per 100 c.cm.	Hellige	per 100 c.cm.
1	0.1375	10	1.375
2	0.2750	20	2.750
3	0.4125	30	4.125
4	0.5500	40	5.500
5	0.6875	50	6.875
6	0.8250	60	8.250
7	0.9625	70	9.625
8	1.1000	80	11.000
9	1.2375	90	12.375
9	1.1000	80	11.000

100 per cent Hellige = 13.75 grammes per 100 c.cm. (Continued at foot of next column)

#### THE NEEDLE IN THE VEIN

By S. D. S. GREVAL LIEUTENANT-COLONEL, I.M.S.

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THE intention is to discuss ways of entering as well as of avoiding a vein, and also to comment on the sterility of the implement used.

1. Should the vein be entered by a primary thrust, from above, through the skin and the wall of the vein together, or by a secondary thrust, from above or from one side, after the skin has been traversed?

The trauma is minimum when the primary thrust is made from above, through the skin and

#### (Continued from previous column)

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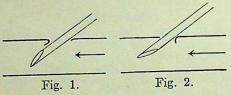
the wall of the vein together. This procedure is possible when the vein is fixed either naturally

or by the finger of the operator.

If the needle has traversed the skin and then travelled between the skin and the vein or to one side of the vein, it can be made to enter the vein by a secondary thrust from above or from one side. The secondary thrust being more oblique than the primary one has a more tearing action. The trauma is greater. The procedure of choice, therefore, is the entry with a primary thrust from above.

#### 2. Should the oblique opening in the needle be upwards or downwards?

The needle has a cutting edge (not a boring point) and takes a flap from the wall of the vein into the lumen. In figure 1 the needle is introduced into the vein of the arm, pointing towards



the heart as is done in giving an intravenous injection, with the opening looking upwards. The flap is bent with its convexity against the flow of blood (indicated by the arrow). On withdrawal of the needle such a flap may not fall back into position easily. In figure 2 the needle is introduced in the same direction but with its opening looking downwards. The flap is bent with its concavity against the flow of blood. On withdrawal of the needle such a flap will fall back into position easily. If the needle happens to puncture a valve in the vein the consideration for the flap acquires added force.

In giving an injection the introduction of the needle pointing towards the heart, apart from directing the injected fluid centrally, enables the operator to face the subject and watch the latter's face. In taking blood from a vein it might be thought that the needle should be introduced pointing away from the heart and that the oblique opening should look upwards. There is, however, no need to introduce the needle pointing away from the heart and lose the benefit of watching the subject's face. With appropriate compression on the limb (not abolishing the pulse) the blood in the vein, being under pressure, flows regardless of the direction of the needle.

It has been recommended (Wiener, 1935) that in dealing with small veins the needle may be introduced pointing away from the heart. It does not appear to be necessary to do this. The procedure of choice, therefore, is the introduction of the needle pointing towards the heart with the oblique opening looking downwards.

#### 3: The bore of the needle

The writer in a recent communication suggested that the bore of the needle for taking

blood from a vein for transfusion should not be larger than that of a 20 c.cm. Record syringe needle which is usually used in giving intravenous injections (Greval and Chandra, 1940) Since then other workers' opinion to the same effect has become available (Boland, Craig and Jacobs, 1939, publication delayed in transit).

#### 4. Special sites for puncture when the needle has failed to enter a vein at the usual sites

Attention is drawn to three special sites. (i) for taking blood or giving an injection veins over the malleoli are available regardless of the obesity of the subject; (ii) in small children the external jugular vein can be entered; and (iii) for giving saline or blood, corpora cavernosa of the penis (Snyder, 1929) can always be

A puncture in the fontanelle in infants is to be avoided.

#### 5. How unintentional entry into a vein can be avoided

(1) When giving an intramuscular injection, the needle should first be introduced and a dry puncture assured. The syringe containing the medicament is then attached to the needle. When the medicament is contained in a rubbercapped bottle, yet another needle suitably stuffed with sterile cotton-wool is necessary to admit air (filtered) into the bottle, to replace the volume drawn into the syringe.

(2) When giving a subcutaneous injection needing speed, as is done in antirabies clinics, and involving regions which cannot be guaranteed to be free from venules, such as the abdominal region, it is better not to use a fine needle. The chances of a needle with a large bore, such as is used with a 20 c.cm. Record syringe needle, of entering a venule are much less than those of

a fine needle.

(3) When giving a subcutaneous injection in the arm, pinching the skin and inserting the needle in the base of the fold are to be preferred to stretching the skin and thrusting the needle into it. In the tissue over which the skin is stretched venules are flattened and are likely to be entered by a fine needle which is usually used. In the tissue which is pinched the venules are stretched and narrowed. They are more likely to be cut across than entered by even a fine needle. Even for this injection the writer does not use a fine needle.

#### 6. Sterility of the needle

Sterility of the syringe was discussed in no less than nine communications, in the British Medical Journal, between 30th April, 1938 and 11th June, 1938—i. Editorial Annotation (1938), ii. Crabbe (1938), iii. Murray (1938), iv. Jones (1938), v. Smalley (1938), vi. Editorial Comment (1938) ment (1938), vii. Gray (1938), viii. Manclark (1938), and ix. Pines (1938). It came up again as an integral part of a review of recent advances in vaccine therapy, in 1939 (Fleming,

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The present writer adds the observation that a syringe and needle, howsoever sterilized, that a symmetric when dried by sucking and cease to the ordinary air of the room. He expening uses a Record syringe and his method of sterilizing is to: (i) clean the syringe and the needle immediately after use, (ii) leave them for 15 minutes in 7 per cent phenol in water, (iii) transfer them to a pan of boiled water, (iv) dehydrate them by sucking and expelling absolute alcohol—second quality, kept for the purpose, (v) keep them assembled ready for use, in absolute alcohol in metal cases and (vi) wash them by sucking and expelling sterile saline. Once a month the metal containers are emptied into a jar to yield the absolute alcohol of the second quality and refilled. The absolute alcohol of the second quality is also renewed once a month. When a Roux's syringe is used, it is sterilized every day in hot oil (temperature 120° to 140°C.) completely to begin with, i.e., all the parts excepting the top of the rod of the piston are dipped separately and then assembled. Later, filling the syringe and the needle twice with the oil suffices. Excess of oil is removed (if desired) by sucking air through a flame (for this step a guard covers the needle) and expelling it, or preferably by sucking and expelling boiling water.

## 7. Prepuncture and postpuncture care of the skin, the vein and the subject

Painting liberally with simple solution of iodine (B. P.) is preferable to swabbing with spirit or a solution of phenol. The stain is removed (if desired) by swabbing with absolute alcohol. Immediately before the withdrawal of the needle compression on the limb is removed and a swab (on a stick) soaked in the iodine solution is placed in contact with the needle to press on the puncture the moment the needle is withdrawn. Bleeding, if any, is checked by pressure. Flexible collodion (B. P.) is dropped on the puncture with a dropper to cover an area the size of the thumb nail. After a false skin has formed (which may be delayed in hot and wet months for over 15 minutes) the subject is allowed to depart with advice that the punctured limb should not be used in exertion of any kind for 24 hours.

Prepuncture care is specially important when the subject is a donor of blood for cold storage. The fact that accidents never (or hardly ever) occur with the therapeutic use of the needle, after a certain precaution has been taken, does not guarantee the bacteriological sterility necessary in storing blood. Stray micro-organisms injected into the blood stream of living subjects are as a rule promptly destroyed; injected subcutaneously they are also destroyed with some effort on the part of the tissues; swept into blood taken for storage they may or may not be overwhelmed; falling into culture media they will grow as contaminants without fail, of course. Liberties taken with the needle in therapeutical

procedures will more often than not contaminate nutrient broth and agar. The same remarks

apply to the syringe.

Incidentally, the syringe and needle which are filled with ordinary air in order to replace the contents of a rubber-capped bottle are not, strictly speaking, sterile although they are more so than when they have been dried by repeated filling with air. Sterility of the contents of a rubber-capped bottle into which have been blown many syringes full of unfiltered air is always doubtful.

The swabs on sticks are sterilized and kept in

separate test tubes.

The subject, if a donor for cold storage, should attend after a very light meal, if not after only liquid refreshment. Chyle in the blood interferes with the examination of the contents of the stored bottle. He should be accommodated in a long chair in which he can be placed in a supine position if necessary. Aromatic spirits of ammonia (B. P.) and drinking water should be available. Means of applying pressure over a hæmatoma should also be available. Provision must also be made for dealing with hæmophiliaes.

#### 8. Importance of minor details

The long list of recent references appended to this short communication is indicative of the importance of the items concerning which minor details have been given. More veins have been pricked in England and India during 1939 than ever before. The practice is likely to last. It is hoped that these remarks on minor details will add to the ease, safety and utility of the process of pricking veins and tissues.

#### Summary

1. A vein is best entered by a primary thrust from above, through the skin and wall of the vein together.

2. The needle should be directed towards the

heart with its oblique opening downwards.

3. A needle of large bore should not be used

for taking blood.

4. When for any reason a needle cannot enter a vein at the usual sites, other useful sites for injection are: (i) veins over the malleoli, (ii) external jugular vein—in small children, and (iii) corpora cavernosa of the penis. The first two sites serve for taking blood also.

5. Entry into a vein has to be avoided in giving injections subcutaneously and intramuscularly. For the former the needle should not be extremely fine and the skin should not be stretched, but pinched. For the latter the needle must be introduced alone and a dry puncture

6. A long list of recent references on sterility of the syringe (and of necessity of the attached needle) is available. An additional observation is that the syringe and needle dried by sucking and expelling air from a room are not sterile.

7. Prepuncture and postpuncture care of the skin and the vein are best assured by iodine before and collodion and rest after the puncture. Drinking water and aromatic spirits of ammonia should be at hand, and so should be the means of stopping bleeding from the puncture.

8. Minor details in pricking veins and tissues

have become more important recently.

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SUMMARIES OF THE PAPERS READ AND THE DISCUSSIONS THAT FOLLOWED AT THE TUBERCULOSIS WORKERS' CONFERENCE, NEW DELHI, 20TH TO 23RD NOVEMBER, 1939

#### A. DIAGNOSTIC METHODS

(a) 'X-ray as a Guide to Diagnosis' paper by Dr. T. J. Joseph

WHILE it is not true that x-rays are everything, it cannot be denied that tuberculosis work done without their help is bound to be unsatisfactory. In a national campaign against tuberculosis facilities for early diagnosis by x-rays are essential, both if the disease is to be cured in the individual and if it is to be prevented in the community.

X-ray examination has its limitations and pitfalls and it cannot completely cover blanks left by clinical laziness. Various devices like careful screening, stereoscopy, serioscopy, tomography, etc., are now used to overcome limitations arising out of the anatomical position of the lungs and the lesions. Special reference was made to the hilus region as the most common area for mistaken diagnosis.

Fluoroscopy has its obvious advantages but it is only complementary to other procedures and not an alternative to radiography.

'Physical Examination and Clinical Observation as a Guide' paper by Dr. L. R. Dongrey

In emphasizing the importance of x-ray for early diagnosis a slogan has been evolved that 'tuberculosis must be seen and not heard'. When it is known that x-ray examination has its limitations and pitfalls, such a tendency shows lack of correct perspective. The objective of the clinician is to study the patient and his reactions to the disease as expressed in his symptomatology. As the early symptoms are often vague and elusive and may be common to several diseases a period of close and prolonged observation of the clinical course of the disease is essential.

Physical signs express the physical condition of the

Physical signs express the physical condition of the subjacent viscera, but do not indicate the ætiology of the signs nor always give information about the activity of the underlying disease. Physical signs derive their value in association with symptoms. Of all methods of physical examination auscultation is the

most reliable, and the most reliable of all auscultatory signs when obtained is persistent râles over the upper portion of the lungs. This is almost diagnostic of pulmonary tuberculosis provided suggestive symptoms are present.

The clinical study of the signs and symptoms makes the diagnosis probable, the laboratory may confirm it

as well as the x-ray.

(c) 'Blood Examinations and Examination for Tubercle Bacilli as a Guide' paper by Rev. R. M. Barton

Examinations for tubercle bacilli are the most important. The methods aimed at are those which provide the highest possibility of finding bacilli which

are present, avoiding those which give false positives.

Culture of bacilli is now possible in all fairly wellequipped laboratories and Jensen's modification of Lowenstein's medium is widely used. If sufficient material is seeded, this method gives equally good and sometimes superior results to that of guinea-pig inoculation, which is expensive and takes longer than

the culture method.

Figures from 1,200 consecutive cases from the Union Mission Tuberculosis Sanatorium, Arogyavaram, are given and a plea is made for the adoption of minimum standards with regard to positive and negative findings on admission to, and discharge of a patient from, the institutions. The aim of all institutions should be to include sputum and stomach-wash cultures, and it is suggested also that certain laboratories should be entrusted with research work with regard to the bovine and human type of infection in India for which very

little work has been done so far.

No blood picture specific for tuberculosis has yet been found. Examinations for changes in the leucocytes and sedimentation rates are commonly used. These have to be used with caution for positive diagnosis, as their main value as regards diagnosis up till

now is only in excluding active tuberculosis.

(d) 'Tuberculin Test' paper by Dr. P. K. Sen

The specificity of this test has recently been contested by few workers, but for practical purposes the test can be accepted as specific by denoting infection with bacilli. Various methods of the test are tubercle mentioned but the Mantoux method is considered to be the most valuable and is preferred. In order to obtain uniform results only induration should be taken into account in reading the results of the test, and not erythema.

As higher doses make the test non-specific, doses 1 mg. are not recommended. Negative bigger than reactions, with certain limitations, exclude tuberculosis, and with positive reactions the younger the subject, the stronger the chances of active disease being present.

#### Discussion

In discussion, the importance of x-ray examination in diagnosis was emphasized, including tomography, and was thought by many to be the most important of all the methods of diagnosis. At the same time others emphasized physical examination and the observation of clinical symptoms and considered these equally of clinical symptoms, and considered those equally desire for some kind of standardization of the terms used in describing abnormalities in the radiograph. The necessity for research as to whether bovine tuberculosis is present to any extent in India, was brought out.

The result of the discussion was that the difficulty of diagnosis was realized and that frequently diagnosis could not be made by using one method alone, but that all the facts provided by x-ray examination, physical examination, laboratory examination, and a study of clinical symptoms, were often needed, before a final diagnosis could be made.

a final diagnosis could be made.

B. 'IMMUNO-BIOLOGICAL DEFENCE MECHANISM' BY DR. C. FRIMODT-MÖLLER

Difference of opinion exists about the relationship of allergy and immunity to each other, and about their 1940

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individual rôle in the healing of tuberculous lesions.
The allergic reaction fixes the bacilli to the seat of The allergic reaction has an exudative inflammation, which also implantation by an exudative inflammation, which also The ancient of the second of the diminishes the flow of lymph into the body from the diminishes the flow of lymph into the body from the lesions, and thereby also checks the flow of toxins into lesions, and circulation. Further, the response of the the general circulation of various bodies which body leads to the production of various bodies which body leads to the production of various bodies which confer a relative immunity against re-infection. But confer a re-infection occur, due either to a too massive should a re-infection or to too virulent bacilli, the local defences should a re-infection or to too virulent bacilli, the local defence re-infection or to too virtuent bacini, the local defence mechanism may act so severely that the very defence measure becomes destructive and very dangerous to the patient himself, in its attempt to eliminate the

lesions in the lungs. The special treatment of pulmonary tuberculosis, therefore, aims at a careful regulation of the action of the immuno-biological defence mechanism so that on the one hand it does not act too strongly, and on the the one hand it does not act too strongly, and on the other hand acts strongly enough to produce gradual and solid healing of the lesions. Physical and mental rest, and sometimes localized rest of the diseased part by various surgical procedures, are the means of influencing the defence mechanism favourably. The special treatment, therefore, consists of rest and graded exercise in the right proportion in each individual patient so that enough tuberculo-proteins are allowed to circulate in the blood, but only enough to create an inflammatory exudation sufficient to build up strong scar-tissue round the foci and so produce a lasting

#### C. METHODS OF CONTROL OF THE TREATMENT

## (a) 'X-Ray as a Guide to Treatment' paper by Dr. P. V. Benjamin

A cursory examination of the film is sufficient for diagnosis, but a detailed study is necessary for judging the line of treatment; the extent, distribution, type and character of the lesion; the number, location and the nature of the walls of cavities when present; and the position of the mediastinum. The condition of the diaphragm and planet and p diaphragm and pleura can only be judged by an x-ray film and a careful fluoroscopy.

It is being realized that routine examination is incomplete without an x-ray examination and this applies equally to initial and subsequent examinations. Institutions are therefore now planned where examination rooms and x-ray rooms form one unit. In taking serial films, the various films should have as far as possible equal exposures, otherwise they may create false impressions.

## (b) Paper on 'Clinical Observation as a Guide to Treatment' by R. B. Dr. Kesava Pai and Dr. Jay Ram Naidu

Pulmonary tuberculosis is a highly pleomorphic disease. No two cases are identical; therefore, a close clinical observation of the progress of the case is as important as x-ray and laboratory tests. A normal pulse rate and terms of the case is as important as x-ray and laboratory tests. pulse rate and temperature does not necessarily indicate inactivity of the disease. General condition, pulse rate differences between daily maximum and minimum temperatures, sedimentation test, blood index and results in judging activity. in judging activity.

Clinical observations, often, though not always, give timely indication for necessary changes in the line of

## (c) Papers on 'Physical Examination as a Guide to Treatment' by Drs. P. T. Patel and C. N. Chandrachud While admitting the limitations of the value of individual physical signs, it must be stressed that a thorough methodical physical evamination can give thorough methodical physical examination can give valuable information to the clinician. It indicates the rough structural changes that have taken place in the underlying organs but these findings to be of real help underlying organs, but these findings to be of real help must be compared and correlated with information supplied by other methods.

#### (d) 'Blood Examinations as a Guide to Treatment' paper by the Rev. R. M. Barton

The quick response of the blood picture to changes in the patients' condition makes it a valuable guide during treatment, especially so as these, generally speaking, precede the clinical symptoms.

The importance of leucocytic reaction and sedimentation rate is emphasized. A blood index based on (1) the neutrophile-lymphocyte ratio, (2) the mononuclear-lymphocyte ratio, (3) the percentage of neutrophiles of Stabkernige form and (4) the percentage of Westergren one-hour sedimentation reading, has been used for the last seven years at the Madanapalle Sanatorium and has served as a valuable guide in assessing the condition of the patient under ordinary sanatorium treatment.

Adverse changes in the blood indicate either some complication or the spread of the disease in the diseased or the contralateral lung or may suggest that too much exercise is being done. But to be of real value blood examinations must be made at regular intervals, and be made by experienced blood workers.

#### Discussion

In discussion following the papers, several speakers stressed the importance of control of treatment by x-ray, although it was recognized that frequent x-ray examination of patients was not always possible for the general practitioner. A number of speakers showed also how important clinical observation and physical examination were, in addition to x-ray examination, and several spoke of the value of blood examinations. As in diagnosis, so in control of treatment, one method alone was insufficient, and if the patient was to get the best treatment x-ray examination, physical examination, blood examination, and observation of clinical blood examination, and observation of clinical symptoms, must all be employed.

#### D. TREATMENT

## (a) 'Artificial Pneumothorax' paper by Dr. D. V. Muthu

Nowadays nobody questions the value of collapse therapy or the merits of the underlying principles, though there is slight diversity of opinion as to how soon it should be employed in an individual case. Decision should be made taking into account the history of the case, the course of the disease, and its character, examinations and constitutional by

Indications for artificial pneumothorax are mentioned. As this operation in a great majority of cases makes a patient free from tubercle bacilli it assumes extra importance for public health reasons. It also reduces the stay of the patient in a sanatorium and enables him to return to work early and it has therefore a great social value.

#### (b) 'Thoracoscopy' paper by Dr. P. V. Benjamin

Artificial pneumothorax is not successful in every case and 40 per cent of its failures are due to adhesions, which are often distributed over the diseased part of

the lung making a selective collapse impossible.

Two types of thoracoscopes are described and the advantages and disadvantages of diathermy and galvanocautery are discussed and the difficulties of cutting adhesions in certain situations are brought out.

A recent acute onset is a contra-indication to the operation. A complication after the operation is pleural effusion, but its frequency is not more than in artificial pneumothorax.

Review of the results of 210 operations in 186 patients at the Madanapalle Sanatorium shows that by artificial pneumothorax 53.5 per cent of the patients became bacilli free, whereas the figures after cauterization of adhesions were 63.7 per cent. The operation, therefore, improves the expectation of life and saves many a patient from serious operations like thoracoplasty.

#### (c) 'Thoracoplasty' paper by Dr. W. G. Jones

It is emphasized that it is an error to adopt this operation as a last resort or to delay it because it is

considered to be too drastic and therefore too dangerous for Indian patients, while it is no less an error to consider it to be so easy as to suppose that every surgeon can perform it. This operation needs to be known and used in India more than it is at present. Its risks are small with skilled and experienced surgeons. geons, and it offers considerable chances of cure to that large group of cases that cannot benefit by pneumothorax or phrenic surgery. While its application is chiefly to unilateral cases, it can be used in conjunction with control large. conjunction with contra-lateral pneumothorax and phrenic interruption in many bilateral cases as well. To most, if not to all, chronic cases in which pneumothorax has failed, thoracoplasty offers the shortest road to cure and a good proportion can be rehabilitated for work.

#### (d) 'Phrenic Nerve Operations' paper by Dr. R. Viswanathan

These are used to produce temporary or permanent paralysis of the hemi-diaphragm. It is a component procedure in the armamentarium of collapse therapy. It has its limitations and the results will depend on the judgment exercised in its application. Various indications for the operation are mentioned. A modified technique for the operation with the patient sitting in a dental chair is recommended.

#### Discussion

Surgical treatment.-In discussion, several spoke of complications in artificial pneumothorax treatment, and some described the apparatus, which they are using, designed to avoid some of the accidents possible in giving artificial pneumothorax. In home treatment of tuberculosis, too, artificial pneumothorax had to have a place, because early treatment and prevention of spread of infection were urgent, and a simple apparatus was necessary for this. Some discussion took place on aspiration of pleural fluid and replacement by air. Hæmoptysis following artificial pneumothorax was mentioned by several.

In the discussion of thoracoscopy, the advantages and disadvantages of the direct and indirect vision type of apparatus were brought out; the complication of subcutaneous emphysema, the question of cauterizing adhesions which did not keep open a cavity and when the sputum had become negative, and the control of subsequent refills by x-ray were also raised.

In the discussion on phrenic operations, the general consensus of opinion was against phrenic operations as the operation of choice; there was a risk of irresponsible operation just for the sake of doing something and because it was an easy operation. It still had a place in a small number of cases in which other measures had failed. Some discussion took place on the position of the patient during operation—sitting up or lying down.

Thoracoplasty.—In a vigorous discussion there was criticism of Dr. Jones' opening paper, some speakers not agreeing that the percentage of patients in whom thoracoplasty was indicated was as high as that sugthoracoplasty was indicated was as high as that suggested in the paper; some considering there was an over-emphasis on surgical methods as against non-surgical methods of treatment of pulmonary tuberculosis. In reply, Dr. Jones stated that the aim in treatment was to use methods which produced the best results, and he believed that in a large number of patients it was proved that thoracoplasty did do this.

#### (e) 'Gold Treatment' paper by Dr. Y. G. Shrikhande

While a good deal has been said for or against the use of gold, the fact that it is still used is evidence of its efficacy in suitable cases. Of the various preparations in the market the choice lies between

sanocrysin and solganol.

Gold treatment is of special value in exudative lesions, but in selecting cases attention should be paid to the extent of the disease, resistance of the patient and efficacy of his eliminative mechanism. While large doses are harmful, smaller doses are useless and a plan for proper dosage is suggested.

Intra-pleural injections of gold salts with repeated aspirations have also been used with good results in the treatment of pleural effusions complicating pulmonary tuberculosis.

#### Discussion

The question of treatment with gold preparations evoked much discussion, some maintaining that there was little evidence of its producing any good results, others maintaining that after a considerable experience over many years they were convinced that it was of value, especially in fresh exudative lesions and as an in the contralatoral tendence. aid in controlling disease in the contra-lateral lung during artificial pneumothorax treatment. Dosage and complications, and contra-indications, were discussed

At the end of the discussion the question of carbolic injection was raised and the experience of those who had tried it was against continuing this treatment, as

also with cadmium sulphite.

## E. 'Prognosis and after-results' by Dr. P. V. Benjamin

It is pointed out that in the general population the prognosis of tuberculosis is good, but in an individual in whom the disease has become manifest a great many factors—age, sex, type of the disease, presence of tubercle bacilli, complications both tuberculous and non-tuberculous—have to be considered. The influence of an early diagnosis, appropriate treatment, and proper after-care cannot be over-estimated.

Figures for the after-results of patients discharged from different sanatoria are given and show improved prognosis under modern methods of treatment.

#### Discussion

A short discussion served mainly to emphasize what was already in the paper, together with some mention of family history, nutrition, and the question of urban and rural origin.

F. 'CLASSIFICATION OF STAGES OF PULMONARY TUBER-CULOSIS AND OF "DISCHARGE" RESULTS' BY DR. A. C. UKIL

An intelligent basis of classification is not only useful in assessing prognosis and in advising treatment, but essential in comparing results of different methods of treatment followed by workers in different institutions in the country.

With modern advances in the methods of diagnosis and assessing prognosis, different countries have adopted different types of groupings, which are more or less amplification of the Turban-Gerhardt classification.

Information collected in India shows that except the Madanapalle group of sanatoria, no two institutions followed any uniform standard. Discrepancies in the criteria followed by different institutions are pointed out in the paper.

A classification of the adult type of pulmonary tuberculosis based on radiological extent of the disease

is suggested.

#### Discussion

The difficulty and at the same time the necessity of some standardizing of the classification of case records was well brought out in the discussion which followed the paper. A simple method of classifying the condition of the national state on the condition of the patient on admission and also on discharge were both required, as too detailed a classification would only lead to greater difficulty in standardization and associated and associated and standardization and associated as too detailed a classification and associated as too detailed a classification and associated as too detailed as to standardization and comparability of records.

G. 'CAUSATIVE FACTORS IN THE DEVELOPMENT OF TUBERCULOSIS DISEASE' BY DR. B. K. SIKAND

The factors which turn infection into disease and also those which determine the course of the disease in a particular individual are not all well understood. Detailed surveys over a large number of areas and prolonged periods can alone supply the information. prolonged periods can alone supply the information.

Absence of bovine infection in India is pointed out and the effects of race, age and sex on the incidence

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of disease are discussed. Environmental conditions, the of disease are discussed. Environmental conditions, the effect of bad housing and poor nutrition as causative factors are stressed. Bad housing and the unhygienic factors of the people provide the ideal condition for habits of the people provide the ideal condition for habits of dose infection. Defective nutrition both in massive dose infection which is well known in India by quality and quantity which is well known in India by the nauperizing action on the human physiology. quality and quantity which is well known in India by its pauperizing action on the human physiology may represent a real tubercularizing agent.

#### Discussion

In discussion, the multitude of causative factors raised, only showed how little is really known as to what are the real factors in the spread of tuberculosis. what are the certain, an open case plus overcrowding.

## H. 'Spread of infection and its prevention' by Dr. K. S. Sanjivi

In the Western countries the campaign against tuber-culosis is fought on two points—bovine and human sources. Absence of bovine infection in India is mentioned by some workers, but the number of studies on bovine infection is totally inadequate to warrant any dogmatic assertion. The human type of infection spreads mainly through the sputum. The infection may be direct, or indirect, through dust, flies, food and

Exogenous infection is now believed to play a more important rôle in the adult type of the disease. open case must therefore be the focus of our attention, both in his own interest and in the interest of the community. An intensive search for open cases should therefore be organized and the aim of all treatment should be to render open cases bacilli-free.

Importance of co-operation of the general practitioner the public health department, and tuberculosis hospitals in finding open cases and detecting contacts with early signs is stressed. Figures from Madura are given where, with the co-operation of the public health department, 81.3 per cent of the contacts of known cases have been

#### Discussion

Discussion tended to deal mostly with the question of infection in institutions and specially among the staff of institutions treating tuberculous patients. Regular examination of nurses and doctors and others in content with particular examination. in contact with patients was recommended, but the use of masks suggested by some was not generally accepted.

### I. 'Tuberculosis clinic' by Dr. K. Vasudeva Rao

A tuberculosis clinic is the pivot of an antithereulosis clinic is the pivot of an anti-thereulosis scheme and the clinics should be scattered throughout the country—a clinic for every 50,000 of the population. These should be located in the crowded areas of the city. The building should be simple and all facilities for x-ray and bacteriological investigations should be available. The functions of the clinic in regard to diagnosis, treatment of cases, contact examina-tion, and as centres for care and after-care and for tion, and as centres for care and after-care and for education and propaganda, are discussed. The strength and the duties of the strength and the duties of the strength and the duties of the strength and a budget. and the duties of the staff are described and a budget estimate for the recurring and non-recurring expenses of a clinic is single-staff. of a clinic is given.

#### Discussion

A short discussion centred mostly on tuberculosis health visitors, their training, their work, and the number needed.

J. 'THE WORK OF THE CARE AND AFTER-CARE COMMITTEE'

BY DR. T. J. MANI

Work of the care and after-care committee at other countries. The Bangalore committee has made provisions to help needs patients with diet and special provisions to help needy patients with diet and special medicine the property of the best that medicine, though this is not ideal, it is the best that can be done in the absence of sufficient hospital accommodation. As regards employment of arrested

cases a small factory where patients can work under medical supervision is advocated. As regards the care of infants, institutional separation is the one adopted in Bangalore, because familial boarding may not work satisfactorily. Preventoria for older children are necessary, but the financial position does not permit a move in this direction.

#### K. 'Ex-patients' colonies' by the Rev. R. M. Barton

The success of modern methods of treatment of uberculosis has raised many new problems. No doubt lives of many patients are prolonged but so is also the infectiveness of many of them, because the treatment in many patients does not produce permanent arrest or cure. An early return to unsuitable work and unhygienic surroundings not only leads to frequent relapses, but is dangerous to the family and the associates of the patients. In order to produce the best results both from the individual, and from the com-munity's point of view, an individual who is permanently damaged by tuberculosis must be able to live and work in a sympathetic and happy atmosphere, under a disciplined freedom and with a suitable employment that provides security to the patient and his family and in a place where he knows that he can get help whether in health or sickness.

Reference is made to several schemes of after-care and rehabilitation in the Western countries, and the main principles on which the famous Papworth Village Settlement scheme is based are mentioned.

The activities and the growth of the Panipuram ex-patients' colony at Arogyavaram near Madanapalle where at present 12 patients (two with families) are living are described. Attention is drawn to the importance of proper selection of cases, and the correct choice of the industries.

#### Discussion

The necessity for care and after-care committees was agreed upon, as also ex-patients' colonies, but doubts were expressed by some in discussion whether managing bodies of institutions could be convinced of the need, or if money could be found; suggestions were also made of various possibilities for colonies. But if the need is recognized by the leaders in tuberculosis work, and they had vision and enthusiasm, there seemed no reason why colonies should not be established but they must be built in connection with treatment institutions.

## 'Institution and home treatment' papers by Dr. R. H. H. Goheen and Dr. R. K. Kacker

The vast majority of those afflicted with tuberculosis are found in their homes. This will continue to be true even when a large number of institutions representing various links in the chain of a complete anti-tuberculosis scheme are established. Home treatment therefore assumes a rôle which cannot be over-estimated. This can, however, only be provided with the co-operation of the general practitioner, who should be adequately instructed in regard to the methods of early diagnosis, treatment and of protection of contacts. He should be able to adapt an average home for proper segregation and should judiciously and tactfully effect a change in the patient's and family's dietary, which is very often unbalanced on account of ignorance of the correct facts. In fact, the entire economy of the patients has to be safeguarded.

Need for co-ordination of home treatment with

Need for co-ordination of home treatment with institutional treatment is stressed. Of the many functions of sanatoria, their importance as training centres for doctors and centres for propaganda is emphasized.

#### M. 'TUBERCULOSIS SURVEY' BY MAJOR G. F. TAYLOR

Brief summary of tuberculosis surveys done in India is given and main conclusions which can be drawn from these surveys are mentioned. A plea for surveys all over India was made, as these not only help to define the extent and nature of the problem and of the causes of the spread of the disease in the com-munity, but are useful also in detecting open cases.

Survey work is moreover an effective educational measure, as it awakens and directs public opinion to the problem and opens the way for proper legislative measures.

#### Discussion

In discussion, further information was given of surveys in different parts of India, of experience with tuberculin which had lost its potency, and of the dangers of using a 1 in 100 dilution in routine surveys. The necessity of tuberculosis clinics being properly staffed so that they could carry out surveys, was emphasized. Some discussion took place also on the type of disease as found by examination of patients and at post-mortem examination.

## N. 'PROPAGANDA AND EDUCATIONAL CAMPAIGN' BY DR. A. R. MEHTA

Ignorance about everything scientific is too well known in India but the ignorance about the causes and methods of prevention of tuberculosis is colossal; and if there is any one weapon which can be of greatest use in the fight against the disease, it is the educational

The broad principles of educational campaigns are mentioned and it is emphasized that attention should be focused on the child. Health education should form

part of the school programme, and must be associated with proper instructions of the teachers in hygiene.

As regards education of the adult, the use of the spoken and the printed word and of devices like exhibitions, cinema films and radio talks are mentioned, but the campaign to be successful should be continuous and the messages should be repeated over and over again in different form and manner.

#### 'Co-operation in the campaign against tuberculosis' BY DR. R. KRISHNA

Tuberculosis is a disease whose tentacles spread into various fields of human activity. The anti-tuberculosis campaign to be successful must have co-operation of all bodies concerned in the prevention and treatment of the disease.

importance of the general practitioner in establishing early diagnosis and in connection with schemes for organized home treatment apart from a clinic is emphasized. Various forms of co-operation with the maternity and child-welfare organizations, public health departments, and school medical officers, as well as with other social agencies are given.

#### Discussion

While doubt was expressed as to the value of much of the usual type of propaganda, the discussion generally of the usual type of propaganua, the distance of generally recognized that a true and well-organized propaganda was one of the essentials of the tuberculosis campaign. The facts should be placed before people, but emphasis should be on the side of hope, and not of horror. Public co-operation in the campaign could only be obtained by the right type and method of propaganda and education, beginning even in the schools.

LEGISLATION AND TUBERCULOSIS' BY DR. A. C. UKIL

The growth of sanitary law in the civilized world is traced. History of tuberculosis campaigns in the western countries shows that the first initiative has been taken by private agencies and the State came later to extend, regulate and co-ordinate action of these bodies especially with regard to finance and legislation.

In no country except the United States of Soviet
Russia has the State completely taken over the task of the tuberculosis campaign and in most countries a joint action has been favoured.

Tuberculosis legislation in England, especially in

regard to notification of cases, provision for an anti-tuberculosis campaign, co-ordination of the administrative machinery of the component parts is mentioned in some detail. Defects in regard to notification of tuberculosis in India are detailed.

The opinion is expressed that the time has not yet come

in India for any comprehensive and useful tuberculosis legislation, although it may seem urgent and important. It is suggested that in the interim period the provisions of the Municipal Acts, Rural-Health Acts, be administered with zeal and sympathy and that more powers be delegated to the medical officers of health. Legislation for action in regard to factors which indirectly help anti-tuberculosis campaigns such as rural and town planning, slum clearance and housing to prevent overcrowding and insanitary living, especially in urban and industrial areas is favoured. Spitting on the floors and walls on public roads and public vehicles should be made a punishable offence.

#### Discussion

Discussion emphasized the necessity of educating and influencing municipal and local authorities in tuber-culosis matters as one of the most important parts of the campaign. Enabling legislation was in the earlier stages to be preferred to coercing legislation, as legislation should not be too much in advance of public opinion. Later, mandatory legislation should come.

### Medical News

#### WAR-TIME MEDICAL SERVICES. BRITISH REORGANIZATION AND IMPROVEMENTS

British medical services, before the war, had a worldfamous reputation. It is possible that war-time reorganization may be responsible for permanent improvements which will maintain and increase that

reputation.

Formerly, British hospital services were of two kinds—voluntary and municipal. There were roughly 900 of the former and 1,800 of the latter.

The voluntary hospitals were started by charitable The voluntary hospitals were started by charitable contributions, and in many cases were not allowed by the terms of their foundation to charge fees. They often specialized in some particular form of complaint, such as those associated with the eyes, with ears, nose and throat, or with the chest. In addition they were directed by leading specialists in these complaints, who were able to obtain private practice as well as prestige

from such appointments.

The municipal hospitals, on the other hand, were maintained by local taxation and had full-time staffs.

The doctors were paid comparatively low salaries £350 to £500 a year—much below what a specialist would have to earn in order to maintain his consulting rooms.

The support given to voluntary hospitals was magnificent, but for some years before the war this system had been working with difficulty. As the number of voluntary hospitals increased, so, automatically, did the number of specialists and Harley Street, the famous thoroughfare in which the majority of great specialists have their consulting rooms, gradually became over thoroughfare in which the majority of great specialists have their consulting rooms, gradually became over crowded. The prospects for the specialist decreased. Moreover, as the voluntary hospital services improved, the middle classes (who could not afford to pay a specialist) were more willing than ever the public wards of the voluntary hospital where the hospital specialist worked, rather than go to sprivate nursing home.

This also increased considerably the voluntary that pital expenses. For these reasons it was possible the voluntary system might soon have broken

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in any case, and that a good deaf of hardship may have arisen from the resulting dislocation.

But at the outbreak of war, the British Ministry of Health took over both the municipal and the voluntary hospitals in order to provide the 300,000 beds necessary hospitals air raid casualties. The Ministry is now for possible air raid casualties. The Ministry is now paying the doctors (many of them specialists) as well as maintaining the voluntary hospitals. The immediate future of these institutions seems secure, and it is as maintaining the voluntary hospitals. The immediate future of these institutions seems secure, and it is difficult to believe that when the war is over they will return to the old haphazard system of relying on

voluntary contributions. But State support for the voluntary hospitals is only one of the advantages which war has brought. Under the old system, the specialized hospitals were crowded into London without regard for the needs of the rest of the country. This fault has now been corrected by of the country. dividing Britain into eleven regions, each with a centre that can become the centre of a peace-time medical

Another advantage under the new system is that the big hospitals have only small casualty clearing stations in London, the main base hospitals being out in the in London, the main base hospitals being out in the country. Obviously a hospital in the country can be more spacious, more restful for the patients, and cheaper than one in town. What far-seeing doctors have been striving to attain for years, the British Ministry of Health have accomplished in a few weeks.

[We are pleased to publish this news item which was sent to us by the Deputy Principal Information Officer, Delhi, but we feel we ought to add that the hospital problem in England has not been solved overnight as satisfactorily as the writer of this note seems to suggest. There is another point of view, and there are many who think that the present temporary hospital arrangements are far from satisfactory and are not likely to be accepted even as the basis on which future medical organization in England will be built. The fact, however, that the British system of depending on honorous visiting plants in the property visiting plants. honorary visiting physicians and surgeons is threatened should make those who demand the wholesale adoption of this system in India hesitate.—Editor, I. M. G.]

DISPUTE OVER NAME 'GLAXO'

GLAXO LABORATORIES, LIMITED US. GLAXO SURGICAL COMPANY

In a suit filed by Glaxo Laboratories, Limited, of Greenford, the well-known manufacturers of Glaxo products, against Glaxo Surgical Company of Sialkot City, in the High Court, Bombay, the plaintiffs' case was that they had for soveral years imported into and was that they had for several years imported into and

sold in India pharmaceutical and medical preparations through H. J. Foster & Co. of Bombay; that on almost all such products the name 'Glaxo' appears prominently; that one of such products, a baby food by the name of 'Glaxo', which contains the word 'Glaxo' printed in a distinctive style, has become very popular all over India; that the word 'Glaxo' on any product has come to connote to the public that it is a product of the plaintiffs: and that the word 'Glaxo' appearing of the plaintiffs; and that the word 'Glaxo' appearing as part of the name of any concern has come to connote that such concern is connected with the plaintiffs. They complained that the name of the defendants was so similar to their name as to deceive and that the defendants had by circulars and otherwise advertised and sold surgical products such as hypodermic syringes and stethoscopes under the name 'Glaxo' printed in the distinctive style in which it is used by the plaintiffs, and that such products had been purchased by certain members of the medical profession under the belief that they were the products of the plaintiffs, which they were not.

At the hearing of the suit on the 22nd December, 1939, a decree was passed granting the plaintiffs a perpetual injunction restraining the defendants, their servants and agents from carrying on business under the name of 'Glaxo Surgical Company' or under any name which contains the word 'Glaxo' or under a name which is calculated to deceive the public into believing that it is connected with or associated with the business of the plaintiffs, and from selling or from advertising for sale their products under the name 'Glaxo' or a colourable imitation thereof or in a manner likely to mislead the public into believing that they are products of the plaintiffs. The court further ordered the defendants to deliver up for destruction before the 15th January 1940, all stocks in their possession of letter paper, bills, circulars, leaflets, stationery and goods bearing the name 'Glaxo Surgical Co.' and the word 'Glaxo'.

#### THE BIRTH CONTROL RESEARCH COMMITTEE

THE total number of people who visited and sought advice at the Free Birth Control Centre conducted by the Birth Control Research Committee of Vile Parle at Dadar, during the year ending 15th December, 1939, was 2,896, out of which 1,212 were males and 1,684 were females. The office of the Birth Control Research Committee and the Birth Control Centre will be shifted from 1st of January. 1940, to Empress Mahal, Block No. 4D, Khodabad Circle, opposite the tram terminus, Dadar, Bombay 14.

## Current Topics

## Medical Treatment of Gas Casualties

(Abstracted from the Air Raid Precautions, Handbook No. 3, 1st edition, London, His Majesty's Stationery Office)

(Continued from page 43 of the previous number of the Gazette)

## Need for Preventive Treatment in case of Mustard Gas Contamination

In reading what follows on the treatment of persons contaminated by mustard gas, it should be remembered that many of these may also be suffering from wounds or physical injury. Such casualties will have to be of the with according to the particular circumstances follow case, but the treatment for contamination should chapter so far as is compatible with the nature of the wounds. Clothing should be completely removed,

and the patient himself thoroughly cleansed in order to the contaminant, before the wounds are dressed.

Preventive treatment consists essentially in the speedy and complete removal of all contaminated clothing and in freeing the skin from the contaminant, whether liquid or vapour.

Exceptions to, or modifications of, this general rule may be met with, as, for example, in the case of a small localized liquid contamination of the bare hand, or after exposure to a low concentration of the vapour. when prompt local cleansing of the skin or a change

of clothing respectively will suffice.

In view of the rapid penetration of the skin by In view of the rapid penetration of the skill by mustard gas, treatment should not wait until a doctor is called, and it is part of the training advocated that all members of air raid precautions services, and as far as possible the general public should be taught to undertake treatment for themselves. Nevertheless it is a matter of importance that it should be thoroughly understood by doctors,

Each case will have to be considered on its merits; but, whatever the type or extent of the contamination, speed is the essence of all preventive treatment. Delay of a minute or two in the case of liquid contamination, or of ten to fifteen minutes following exposure to the vapour, before cleaning of the skin is undertaken enhances the danger and may result in definite burns of the affected areas.

When the skin is hot as a result of exercise, and in hot or tropical countries, the results obtained by all preventive methods of decontamination of the skin are inferior to those obtained when the skin is cool and dry, and the need for prompt action is even greater.

After removal of all contaminated garments (which must not be used again until decontaminated) preventive treatment of the skin should be undertaken without The choice of methods is not large, but one or more of them should be readily available at all times. The method adopted must be that which can be most promptly applied.

#### Preventive Treatment for Contamination from Mustard Gas Vapour

After contamination with the vapour of mustard gasi.e., after exposure to an atmosphere contaminated with the gas, or when the outer clothing has been sprayed, or has otherwise come in contact with the liquid form of the gas-preventive treatment should consist of a rapid removal of all clothing followed as soon as possible by a thorough washing of the whole body surface with soap and water, preferably under a shower.

Lavage of both eyes with warm water or normal saline should be carried out as soon as possible, and should be repeated every two hours. Similarly, the effects of vapour contamination of the nasopharynx may be minimized by prompt irrigations.

#### Preventive Treatment for Liquid Mustard **Gas Contamination**

The following methods are possible:-

(a) Bleach treatment.—Thoroughly rub into the affected area, for a minute or so, either bleach ointment or other approved protective ointment, or aqueous bleach paste. This procedure chemically neutralizes the mustard gas.

As a first step in the prevention of burns, when the contamination is small and localized, thorough rubbing with the ointment is the method of choice. For extensive contamination by the liquid, however, a thorough inunction with aqueous bleach paste will be found more

easy of application.

When the operation is completed the ointment should be wiped off, or, if the aqueous paste was used, the affected part should be flushed with water—the object being, in each case, to remove surplus bleach from a potentially injured area. Bleach will destroy free mustard gas quickly, but it will also irritate the skin if left in contact with it. Care must be taken to prevent access of bleach to the eyes.

Bleach should not be used if an erythema has already developed, as it aggravates the condition.

Actual vesication of the skin by drops from mustard gas spray may be avoided if preventive treatment be undertaken within a minute or two after contamination. Even though the delay be longer, bleach will still be the method of choice so long as liquid mustard gas is visible on the skin, as it will mitigate the severity of the resulting burn.

Bleach ointment is made by mixing equal parts, by weight, of 'supertropical' bleach and white mineral jelly, while the aqueous bleach paste consists of 'supertropical' bleach mixed to a creamy consistency with water—roughly, one part of bleach to one or two parts of water by volume. The ointment keeps well in temperate climates, while the aqueous paste retains its effectiveness for several days if it be stored in enamelled containers with well fitting lids; for tropical climates a special protective ointment is desirable.

Bleaching powder is ordinary chloride of lime, while supertropical' bleach is the same substance stabilized by the addition of quicklime, and fulfilling certain conditions of stability and chlorine-content.

Ordinary bleach is more irritating to the skin than the supertropical variety, but in the absence of the latter is suitable for preventive treatment when made up as an ointment with white mineral jelly, or into a paste with water, provided prolonged storage is not required.

The use of white mineral jelly is essential; yellow

mineral jelly in contact with bleach may generate heat and may even produce combustion on storage. If mixing is carried out in bulk, the employment of a mill is advocated in order to ensure a thorough and

uniform consistency.

(b) Removal of contamination by means of Swab the contaminated area repeatedly with solvent. petrol, kerosene, carbon tetrachloride, or other solvent of liquid mustard gas.—It is important to remember that these solvents do not destroy the gas, but merely dissolve it; hence the swabbing must be confined strictly to the contaminated area, and must be repeated.

method is effective if carried out by skilled individuals, and solvents are within easy reach; certain precautions, however, are very necessary. Oil-skin or rubber gloves must be used if available; otherwise, the swab should be only partly immersed in the solvent, and it should be held between finger and thumb by the dry portion, or preferably in forceps, the wet portion is then applied to the contaminated skin so as to soak up the liquid contamination, care being taken that none of the solvent runs over the skin of either the subject or the operator; the contaminated swab is then discarded and the process is repeated for several minutes with fresh swabs, or as long as the characteristic odour of the gas persists on the skin. Thorough washing with soap and water, if available, will complete the treatment. The contaminated swabs must, of course, be destroyed by burning and the gloves and forceps decontaminated.

One disadvantage of this method in the hands of unskilled persons is that the solvent is apt to 'run' on the skin and cause burns on areas comparatively far removed from the original site of contamination; a further disadvantage is the liability of the operator's fingers to become contaminated in the absence of gloves. Employed with care and intelligence, however, the method is valuable in an emergency.

(c) Thorough washing.—Wash thoroughly the affected part with soap and water, using frequent changes of water. This process does not destroy the mustard gas, but merely removes it in the lather; the scrubbing must, therefore, be confined to the contaminated area, and the hands should be safeguarded, if possible, by suitable gloves.

If the liquid contamination be small, localized and known situation, this is an effective method of removing it if carried out promptly. In any case, vesication of the skin is usually prevented if the treatment is not delayed beyond five minutes, though an

erythema will probably result.

With a gross contamination, or when the drops of liquid mustard gas are multiple, the results of scrubbing with soap and water are unfavourable, as it is difficult to avoid spreading the contaminant in the soapy lather to surrounding areas. Under these circumstances bleach treatment is the method to adopt it. treatment is the method to adopt if available.

Should it not be possible, however, to deal with such a contamination until some time has elapsed, thorough washing should still be carried out at the first available opportunity in the first available opportunity in the hope of mitigating the degree of burning.

Special treatment for eyes.—Apart from the skin surfaces, the only other areas to which preventive treatment can be extended are the eyes.

Contamination of the eye by liquid mustard be presents a very serious problem. Should an eye contaminated by the liquid, however small the drop be may be impossed by the liquid, however small the drop be in the liquid be a liquid be a liquid by the liqui may be, immediate preventive treatment should be abilized certain

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undertaken. None of the methods recommended for the skin is applicable for this purpose; simple, but rapid, removal of the contaminant by bland, unirritating methods is indicated.

This may be done by thereusely a simple of the contaminant by bland, unirritating methods is indicated.

ethods is marcated.

This may be done by thoroughly flushing out the This may be done by anoroughly husning out the conjunctival sac with warm, plain water, or some bland solution, after opening the eyelids wide. This flushing solution, after opening and should be reposted. solution, after opening and should be repeated hourly should be most thorough and should be repeated hourly hope of mitigating the damage to the should be most thorough and should be repeated hourly in the hope of mitigating the damage to the eye. If evidence of local irritation appears, a drop of liquid paraffin or castor oil should be instilled to prevent the eyelids adhering. Cocaine is contra-indicated.

#### Curative Treatment for Mustard Gas Casualties

The first essential in the treatment of mustard gas casualties is the prevention of further infection from contaminated clothing; it will be necessary, therefore, to strip the patient completely and to wash the entire to surface, employing frequent changes of soap and water. The opportunity should also be taken at this stage to douche the eyes thoroughly.

The second essential is to relieve immediate

symptoms.

The question of treatment is best dealt with by taking in succession the various parts affected.

#### (a) TREATMENT OF THE EYES

Although liquid contamination of the eye may produce some irritation on contact, this usually subsides and may be followed by an absence of symptoms lasting about half-an-hour. Within one hour, however, the eye is red and swollen, and the lids are half closed. It should be unnecessary to stress the futility of writing. It should be unnecessary to stress the futility of waiting for such signs, or for subjective symptoms to appear before undertaking systematic treatment. The risks attending liquid contamination of the eye are so grave that any history of such an accident should be sufficient to justify immediate and thorough treatment.

At this early stage treatment is limited to thorough and frequent lavage of the eye with a warm 2 per cent solution of boric acid, or normal saline solution, in the hope of mitigating the severity of the inevitable lesion.

After the onset of clinical signs, treatment is largely symptomatic, and in the earlier stages will be confined mainly to the relief of pain and to free irrigation; the latter, however, will present some difficulty owing to the intense photophobia and blepharospasm which exist, and the general cedema which pervades the tissues.

When spasm and pain are marked the application of sterilized 1 per cent atropine ointment (or perhaps an aqueous solution or lamellæ) every 12 hours will give relief, and in all cases where the cornea is affected this treatment should be persisted in. Cocaine should not be used to allay the pain, as this drug, which exerts only a transient anæsthetic action, tends to loosen the corneal epithelium and facilitate ulceration

Free drainage of the discharge is essential, and on no account should the eye be bandaged as this will only result in damming back the secretions with disastrous results. Shades of brown paper or other light material may readily be improvised to relieve the light material may readily be improvised to relieve the photophobia, and a few drops of sterilized liquid paraffin may be inserted several times a day to prevent the eyelids becoming alread together and impeding free the eyelids becoming glued together and impeding free

drainage.

When the discharge becomes muco-purulent the instillation of a weak (2 per cent) solution of argyrol or protargol twice daily will be found useful. This treatment is of particular importance when the cornea an infiltrating ulceration. Should this occur, the ulcer of pure carbolic acid put on with a nearly dry brush and hot applications over the closed lids four times a day will assist in relieving pain.

If hypopyon supervenes and does not clear up with hot typopyon supervenes and does not clear up with

If hypopyon supervenes and does not clear up with bathing, atropine and frequent cleansing of the conjunctival sac, Saemisch section is indicated.

With vapour contamination of the eye the prognosis is very much more favourable, and it is important that the patient be reassured from the outset that his eyesight will not be lost. Treatment, however, must be prompt and assiduous, as all contamination of the eye, however light, is a prolific source of invalidism.

For mild cases, where exposure to the vapour has been of a short duration, frequent lavage or warm irrigations every two hours will suffice to clear up the condition. The instillation of a few drops of liquid paraffin will prevent the tendency of the eyelids to adhere, and a quiet, darkened room or an eye-shade will materially add to the patient's comfort if any degree of photophobia be present. An astringent lotion and general tonic treatment will complete the cure.

In more severe cases, however, both pain and spasm may be marked, and the cornea may be affected. these conditions the treatment should be on the lines of that recommended for cases of liquid contamination, the primary indication being the prevention of corneal

ulceration or the formation of adhesions.

#### (b) TREATMENT OF THE RESPIRATORY TRACT

The early rhinitis is usually overshadowed by the condition of the eyes; should there be pain and distressing discharge it may be treated with copious warm douches of sodium bicarbonate in 5 per cent solution several times daily. In the rare cases where a persistent muco-purulent discharge, associated with ulceration and occasionally with epistaxis, is long continued, an astringent lotion containing zinc sulphate with boric acid will be found helpful.

Laryngitis.—The laryngeal irritation is best dealt with by topical treatment such as laryngeal spraying or by the inhalation of steam from a pint of boiling water containing a teaspoonful of a mixture of menthol grs. 10

in 1 oz. tinct. benzoin. co.

Broncho-pneumonia.—As the majority of deaths from mustard gas in the last war were due to secondary infections of the respiratory tract, treatment should be directed from the outset towards combating bacterial invasion of the bronchi.

As a preliminary step against extraneous infection, all cases of mustard gas poisoning in which the respiratory tract is involved must be kept apart from other patients suffering from infective pulmonary disorders; they should, if possible, be segregated in special wards, and the onset of broncho-pneumonia in one of them should entail his isolation.

The routine employment of volatile antiseptics from the earliest stage will be facilitated by the adoption of a pliable, perforated mask, fashioned in the form of a Burney Yeo inhaler, containing a pad of gauze on which a few drops of the antiseptic are placed hourly. A useful formula is the following:—

Menthol			gr. 20
Chloroform			min. 60
Creosote	PARTY.		min. 60
Ol. Eucalypti			min. 20
Tinct. Iodi			min. 30
Sp. Vini Rect		To word	to one oun

The value of menthol in mustard gassing is enhanced in those cases which require operative treatment for some concomitant wound. In these cases the laryngitis is such that, until it has been allayed by the inhalation of menthol, it may be impossible to induce anæsthesia,

as the anæsthetic sets up paroxysms of coughing.

In the various stages of the broncho-pneumonia, treatment is symptomatic and follows the recognized rules of procedure, including the employment of expectorants where the muco-pus is tenacious and difficult of expulsion. It may be stated here that the prophylyctic venesection advocated for phosoners. prophylactic venesection advocated for phosgene cases, which is of value in the early treatment of pulmonary edema, has no place in the treatment of mustard gas cases, though occasionally it may be indicated at a later stage to relieve the right heart of embarrassment and cyanosis induced by a diffuse broncho-pneumonia. The same may be said of oxygen therapy, which, although essential in the pulmonary ædema caused by phosgene, is only indicated occasionally and at a late stage in mustard gas poisoning when a condition of oxygen want is established as the result of grave and widespread pulmonary damage.

#### (c) TREATMENT OF THE SKIN

As in other regions of the body, septic infection is the most potent factor in delaying the satisfactory healing of skin burns. When it is remembered that mustard gas penetrates, and in so doing devitalizes, the skin, it is obvious that early preventive treatment is of paramount importance, inasmuch as it will lessen the severity of the skin burns and reduce the risk of sepsis, and that any curative treatment should have some

antiseptic value.

As a preliminary to all local treatment it is essential to cleanse the skin as thoroughly as its damaged condito cleanse the skill as thoroughly as its damaged condi-tion permits, and to clip short all hair, if any, on the affected area. It may be useful to repeat here that the application of bleach in any form to a skin which is already showing signs of damage will aggravate the ensuing burn. It must also be noted that skin surfaces damaged by mustard gas are exceedingly susceptible to trauma, and that even the continued pressure of an ill-fitting bandage may lead to an extension of the damage. As treatment will vary according to the nature and degree of the burns, it will be best to consider these in detail:-

(1) Erythema.-Mild cases which do not proceed beyond an erythema heal spontaneously, with possibly some descuamation and pigmentation. They may be some desquamation and pigmentation. compared to sunburns in severity and discomfort, and clear up just as readily. If the skin is unbroken a mildly antiseptic dusting powder may be applied.

(2) Vesication.—It is this stage that will afford a

critical test of successful treatment through the elimination of secondary infection, as the devitalization of the

tissues in these cases is much more profound.

Any available cleansing treatment in use in surgical practice will suffice for the undamaged skin surrounding the burn itself. In the last war extensive use was made of Eusol and of Dakin's solution for the treatment of burns, but they are too painful for continued use on raw surfaces. Picric acid and similar powerful germicides are undesirable because of the toxic symptoms that may follow their absorption, while ointments and pastes are, as a rule, contra-indicated because of their tendency to seal up discharges; for the same reasons powders are undesirable as they are apt to produce crusts which retain the discharge.

When discrete, circumscribed blisters make their appearance they should be evacuated, with an aseptic sterile needle, gentle pressure being applied, if necessary, upon the walls of the blister with a sterile swab to ensure complete evacuation; the intact epithelium should then be allowed to collapse and seal down the raw, sensitive surface underneath. This evacuation of fluid from blisters may have to be repeated owing to the continued oozing of serum from the raw area; if this procedure be delayed some hours the serum may be found to have coagulated, in which case the overlying epithelium should also be removed. The further treatment of these circumscribed vesicles consists in the application of dry dressings.

Satisfactory results have followed the use of crude cod liver oil in the treatment of comparatively small mustard gas burns after evacuation of the blister and removal of dead skin; the healing of the burns was rapid. The oil is freely applied on lint, which is then covered by a pad of cotton-wool. The dressings are changed daily; little or no irritation is caused, and the oily dressings come off easily and without pain.

When larger areas are affected, however, and when the blisters are confluent, better results will follow the use of a non-irritating antisentic such as 'Dettol'

use of a non-irritating antiseptic such as made by adding 20 per cent by volume of 'Dettol' to a freshly prepared 5 per cent solution of tannic acid. After evacuating all blisters and removing the loose epithelium, the solution is applied directly to the raw surfaces either as a spray or preferably on lint as surfaces either as a spray or, preferably, on lint, as a

coagulum appears to form more quickly on a moist dressing than when an atomiser is used. layers of the lint are soaked in the mixture and applied to the burnt area, which is then covered lightly with cotton-wool and a gauze bandage; the cotton-wool and bandage may be removed every two or three hours, but the lint is left in position and is re-soaked. The entire dressing may be removed at the end of 8 to 12 hours, by which time a firm coagulum has formed; this is then sprayed with 4 per cent tannic acid solution and dried.

A further step towards the reduction of possible infection may be taken by swabbing a large area surrounding the burn with the antiseptic, for the sepsis which sometimes occurs at the edges of the congulum appears to originate from the surrounding skin; further, it is advisable to repeat this swabbing every four to six hours until the coagulum has separated.

After the separation of the coagulum, the general principles of wound treatment are applied to the unhealed areas which remain; stimulating lotions or scarlet red ointment will be found of use in encouraging

the growth of new epithelium

In cases where the condition is already septic continuous baths, at body temperature, of a mildly antiseptic nature will prove both soothing and efficacious, while hot hip baths of isotonic salt solution are helpful in allaying the intense irritation of mustard gas burns of the groin and genitalia. If hot compresses or fomentations be employed, lint should be used in preference to gauze as it is less painful to remove; oiled silks should be avoided, as they keep the burns sodden and retain the discharge.

#### General Treatment for Mustard Gas Casualties

Where nausea, vomiting or epigastric discomfort is present, the diet should be light and fluids may be given freely; should these not be retained, the administration of 10 to 20 grs. of sodium bicarbonate may be of assistance, and the patient should be encouraged to drink water freely. As convalescence proceeds, and in all cases of uncomplicated body burns, a full diet is required, and this should be as varied as possible. Cases showing evidence of commencing fever, which may be a prelude to broncho-pneumonia, should be suitably dieted

Experience has shown the importance of combating functional after-effects. Functional disorders fall, in the main, into two classes. In the first, exposure to gas, often to a minimal and barely toxic concentration. may yet prove the final factor in upsetting a nervous system already breaking down as the result of physical or mental strain. In such circumstances, and especially when combined with ignorance, it may produce an 'anxiety state' similar in all respects to the neurosis

so common in the last war.

The second class is a more important one, because in these cases a local, but real, organic lesion from mustard gas causes certain irritant reflexes, such as coughing or photophobia, and these sensory reflexes are perpetuated by intropposition almost in a form are perpetuated by introspection, almost in a form of conversion hysteria, long after their organic cause has been cured. Lack of appreciation of this possibility doctors will account the convergence of the possibility doctors. will cause much delay in discharging by doctors casualties.

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Functional photophobia and aphonia are responsible This is not surprising for the great majority of cases. This is not surprising when it is realized that the initial trauma affects a highly organized special sense, and the fear of blindness or dumbness resulting from the injury may very well act to prolong the growten. Ill-advised and unneces act to prolong the symptoms. sary treatment, however is also a probable factor many cases, as, for example, the continued retention of eye-shades long after the necessity for them has passed and the actual lesions have totally disappeared. There can be no doubt that the suggestive influence of There can be no doubt that the suggestive influence wearing a shade under these conditions will prolong

Persistent aphonia, often accompanied by a useless harsh cough is another striking evidence of autor suggestion arising from the initial laryngeal irritation

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The characteristic cough is either dry, or accompanied The characteristic cough is circle dry, or accompanied by watery sputum mainly of salivary origin; it is usually much worse at night, and is of a ringing, harsh if the doctor realizes the nature of the If the doctor realizes the nature of the condiquality. If the doctor realizes the nature of the condition and gives the patient confidence in his early recovery, this functional aphonia yields very rapidly to treatment by suggestion and breathing exercises.

### Weil's Disease in the North-East of Scotland An Account of 104 Cases

By L. S. P. DAVIDSON, B.A., M.D., F.R.C.P. (Edin.) and

J. SMITH, M.D., F.R.C.P.

(Abstracted from the British Medical Journal, 14th October, 1939, p. 753)

During the past few years increasing attention has been paid to the clinical, bacteriological, and epidemiological aspects of Weil's disease, with the result that it has been found to be much more prevalent and more widely distributed than was originally anticipated.

Occupational incidence.—Of 104 cases reported in this

paper ninety-eight occurred in fish workers (filleters, curers, porters, and carters). The remaining six were in farm workers (two), labourers constructing sewers (two), and an engineer in a rag factory, and one arose from harbour immersion. One case occurred in Aberdeenshire and three in Kincardineshire, the remainder arising in the city of Aberdeen. A study of the streets in which the one hundred patients were employed showed that ninety-seven worked in a small area adjacent to the harbour and the fish market.

An investigation into the distribution of the ninetyseven cases in relation to the numerous fish-curing yards in Aberdeen showed that infection had been contracted in no fewer than fifty-three different establishments. It is worth noting that one firm with a large number of employees has never had a case of Weil's disease during the past five years. Accordingly we investigated the working conditions, and found that the type of work undertaken was almost entirely connected with the salt fish trade, in contrast to all the other establishments where Weil's disease has occurred, which energialize in the first trade, in the first disease has occurred, which specialize in the fresh fish trade.

An analysis of the monthly distribution of cases in each of the five years suggests that Weil's disease occurs least often in February and March (a total of four cases in five in five years) and most often in August and September (thirty-one cases in five years).

Age and sex incidence.—There were fifty cases in males and fifty-four in females. The total number of males employed in the industry is 786 and the number of females 1,277. Nearly half the cases occurred before the age of 20 and that four-fifths of these patients were females. This finding is related to the working conditions of the fish trade in which young girls were females. This finding is related to the workers females. This finding is related to the workers females. This finding is related to the workers between the ages of 15 and 20 carry out the procedures of cleaning, gutting, and filleting fish. Between 80 and 90 her cent of the workers below the age of 20 are 30 per cent of the workers below the age of 20 are females, whereas after the age of 30 the majority of the employees are males engaged as foremen, porters, etc.

carters, etc.

Mortality rates.—The figure of 5.7 per cent is a little over one-half of that obtaining in Holland. We ascribe the low death rate to the high incidence of healthy young girls in the trade. There were no deaths among in increasing the dangers of the disease is well brought 50 years of age. The same tendency is noted in regard patients were more seriously ill than young ones. The to the toxemia of Weil's disease, and if in addition becomes there is a history of an alcoholic tendency the prognosis becomes correct of an alcoholic tendency at least two becomes correspondingly more serious. At least two partaken of excessive spirits over a long period.

#### CLINICAL MANIFESTATIONS

#### General

The course of the disease may be divided into three The first or febrile stage lasts approximately one week, and during this time septicæmia occurs, anti-bodies are not detectable in the blood, and spirochætes are not found in the urine. The patient is suddenly taken ill and complains chiefly of headache, vomiting, and severe muscular pains all over the body. In severe cases there is marked prostration, and the temperature rapidly rises to 102-104°F. The table gives the percentage incidence of the various symptoms and signs in the 104 cases. Since jaundice rarely appears before the fifth day of the illness a diagnosis of influenza is usually made. The presence of a marked conjunctivitis (pink-eye) and the evidence of a toxic nephritis (albumin, cells, and casts) may be helpful in suggesting the correct diagnosis, particularly if the patient is employed in an occupation in which the hazard of leptospiral jaundice is high.

Percentage incidence of clinical manifestations in 104 cases

Symptoms	Present in	Percentage	
Sudden onset		104	100
Initial chill		71	68
Fever	25.00	103	99
Headache	4	91	87
Muscular pains		103	99
Prostration		46	44
Vomiting		84	80
Cough		18	17
Pharyngitis		34	32
Conjunctivitis		83	79
Icterus		68	65
Hæmorrhages: mild		61	58
" severe		19	18
Enlarged liver		28	26
Palpable spleen		1	0.9
Adenopathy		13	12
Meningitis		10	9

The second or toxic stage is characterized by the absence of spirochætes and the development of antibodies in the blood and the excretion of organisms in the urine. If jaundice has not appeared by the beginning of the second week the case may be considered to be mild; the symptoms then rapidly abate. In moderately severe cases which are going to do well the fever abates and the clinical condition improves; but the jaundice continues for another week or two, and the signs of a toxic nephritis are present for at least a month. In cases doing badly the jaundice becomes intense, the urinary output falls, the blood urea rises rapidly, purpura into the skin and from the mucous membranes occurs, and a falling blood pressure and steadily mounting pulse indicate the gravity of the situation.

In the third stage there is further development of antibodies in the blood. The distressing symptoms gradually subside, but convalescence is greatly prolonged in those who have been seriously ill. An interesting second rise in temperature occurs during the third week of the illness in approximately half the cases.

Meningitis.—In ten cases the symptoms and signs were strongly suggestive of meningitis. The clinical diagnosis was confirmed in each case by examination of the cerebrospinal fluid.

Blood examination.-Red and white cell counts and hemoglobin estimations were carried out in a series of cases. The leucocyte count varied, according to the severity of the disease and the individual's response to the infection, from 10,000 to 30,000 leucocytes per c.mm. of blood. The increase was essentially due to an excess

of neutrophil polymorphonuclear leucocytes, and a typical shift to the left was noted. The red cell count and hæmoglobin were consistently reduced in all cases in which toxæmia was severe, and particularly if purpura was a prominent symptom. In such cases an erythrocyte count of 2,500,000 to 3,500,000 with a hæmoglobin concentration of 40 to 60 per cent was not uncommon. In one case with severe purpura the erythrocytes fell to 1,400,000 and the hæmoglobin to 26 per cent, and a transfusion of blood had to be given.

Biochemical estimations.—The icteric index was estimated in eighty-three cases. In 80 per cent a figure of 10 units or higher was found. Figures for the blood urea are available in eighty-two cases. In 60 per cent a figure of 40 mg. per 100 c.cm. or over was found. Of the six fatal cases one patient died with anuria shortly after admission to hospital, and no figures are available for either the blood urea or the icteric index. Four died with the blood urea greatly increased—namely, 161, 250, 300, and 397 mg. per 100 c.cm. In the sixth case the blood urea was only 89 mg. per 100 c.cm., but this estimation was made on a sample of blood removed on the fourth day of the illness. The patient died at home on the eighth day after the onset, without being admitted to hospital. It is obvious, therefore, that a high blood urea is a sign of serious prognostic importance. Nevertheless it must be remembered that recovery can occur despite a greatly increased blood urea. Thus we have had seven patients recover whose blood urea was respectively 128, 128, 143, 152, 161, 202, and 300 mg. per 100 c.cm. With regard to the icteric index in the fatal cases, the figures were 60, 63, 67, 89, and 150. In contrast, in patients who have recovered we have obtained figures of 100, 166, and 187. In the six fatal cases death occurred between the eighth and tenth days of the illness, by which time the maximum degree of jaundice may not have developed.

#### TREATMENT

(a) Symptomatic.—Treatment on the general lines suitable for any severe febrile disease is required. This includes rest, good nursing, tepid sponging, and the use of diaphoretic, analgesic, and hypnotic drugs. A simple alkaline mixture containing potassium citrate, sodium bicarbonate, and liq. ammon. acetatis is worthy of trial for combating the gastritis and facilitating the urinary excretion. The diet should be low in fats and protein and rich in carbohydrate, since hepatic and renal damage is present. Plenty of fluids and fruit juice, sweetened with glucose, should be given frequently. Iron in full doses will be required to correct the hypochromic anæmia which so often develops.

(b) Specific.—Ample evidence has been accumulated in Holland and elsewhere in regard to the value of anti-leptospiral serum. A reduction both in the mortality of the disease and in the severity of the toxemia has been shown to result, particularly if the serum is given early—that is, within the first four days. After the seventh day, when the septicemic stage is over, the beneficial effects are much less marked. The amount of serum advocated is 10 to 20 c.cm., given intramuscularly or intravenously, the dose to be repeated in four to six hours as required.

#### LABORATORY FINDINGS IN WEIL'S DISEASE

The final diagnosis of Weil's disease is largely dependent on the recovery of leptospiræ from the patient or on the demonstration of immune bodies in the serum when convalescence is being established. In this investigation culture of the blood for leptospiræ has not been extensively employed. When specimens of clotted blood were sent for examination the serum was removed for serologic and biochemical examination, and the clot was then injected intraperitoneally into two young guinea-pigs. Up to the fourth day after the onset of illness the leptospira could be recovered from all cases. After that day the chance of recovering the organism rapidly decreased until on the seventh

and eighth days it was found in the blood of exceptional cases only. These results are in accord with those reported by Japanese workers.

In no case was a positive serum reaction obtained before the third day after the onset. Thereafter the immune bodies rapidly increased in the serum until on the fifth day 50 per cent, and by the ninth day 100 per cent, of cases had given a positive reaction. Furthermore, the actual titre of the serum also increased from 1 in 10 in the early stages to 1 in 10,000 or 1 in 30,000 or more by the tenth day. In only three cases were leptospiræ isolated from the blood at a time when immune bodies could be demonstrated simultaneously in the serum. In case 37 the blood taken on the sixth day showed the presence of leptospiræ and a positive serum reaction of 1 in 30; in case 72 the specimen was collected on the fourth day and gave a positive result on guinea-pig inoculation and an agglutination reaction of 1 in 30; and finally in case 81 the blood showed leptospiræ on the seventh day and a weak serum reaction of 1 in 10.

The leptospira can also be recovered from the urine, but it is essential that the specimen must be inoculated into guinea-pigs as soon as possible after being passed. Two hundred and eleven specimens of urine from eighty-eight cases of proved Weil's disease were tested by this method. In no instance has it been possible to recover the leptospira from specimens collected within the first seven days of the disease. In the period eight to fourteen days after the onset 19.3 per cent of samples were positive, in the period fifteen to twenty-one days 21.5 per cent, and in the period twenty-two to twenty-eight days 9.5 per cent. Thereafter the results were negative. It would appear, therefore, that at no time during the course of the illness can virulent leptospiræ be recovered with certainty from the urine.

Agglutinins may also be demonstrated for *L. ictero-hæmorrhagiæ* in the urine of patients convalescing from the disease. This is probably due to the fact that albuminuria is a constant feature of the disease, and the immune bodies are excreted in a dilute form

attached to the euglobulin.

#### The Clinical Application of Testosterone

By WALTER M. KEARNS, M.D.

(Abstracted from the Journal of the American Medical Association, 3rd June, 1939, p. 2255)

Until two years ago the results in male hormonal substitution were unsatisfactory. It is true that some temporary relief had been recorded at San Quentin prison after Stanley's injection of testicular mush into the musculature of the anterior abdominal wall, but the procedure was never widely accepted. Nor was the isolation of testosterone from the bull's testicle of any great clinical help, since there is little storage of hormone in the tissue and only minute amounts are extractable. The yield is so small that it would require the rendering of 100 bull testicles for the daily maintenance of one castrate. Not until the recent commercial production of testosterone has an effective method been available.

Since the isolation and identification of testosterone and the perfection of a method of synthesis by degradation of sterols, the hormone has been placed on the market by several drug houses. Some esters of testosterone have been proved to be more potent and more prolonged in their effect than the free hormone. Testosterone propionate is the combination offered by the manufactures.

the manufacturers.

The advent of these potent preparations has resulted in exaggerated claims and theories which expand beyond the limits of reasonable speculation. The medical literature is already being cluttered with premature proports demonstrating a lack of knowledge that may result in confusion on the part of the physician attempting to gain an understanding of a most complicated and profound problem.

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#### INDICATIONS

Caution in the choice of patients must be exercised, the possibility of overstimulation and glandular as the possibility of overstimulation and glandular imbalance must be kept in mind. Testosterone must not be injected indiscriminately into every knave who not be emulate the sex behaviour of the not be injected included in the sex behaviour of the cock or aspires to emulate the sex behaviour of the cock or aspires to emulate the sex behaviour of the cock or the squirrel. Because of the possibility of the later atrophy of the testicles, long periods of treatment of atrophy of the testicles, long periods of treatment of adolescent boys and young men must be avoided unless clinical evidence of hypogonadism and low urinary output of the androgens has been demonstrated.

#### CASTRATES

Six castrates were recalled from my past practice and that of two other urologists, Dr. Warren Leaper and Dr. James King. These patients had previously and Dr. sames and received the made the rounds of several physicians and received the usual futile ministrations with orally administered and injected preparations, ending in despair. They were broken men—nervous, apprehensive, depressed, unable to concentrate and devoid of libido, with pale sallow thin wrinkled skin—bearing their crosses tenaciously but at best barely able to hold part-time positions. True to form, these patients had had definite shrinkage in the size of their prostate glands, in some instances to such a degree that the gland was indiscernible by digital rectal examination.

Basal metabolism tests, tests for blood cholesterol, Aschheim-Zondek tests with assay of the urine for gonadotropic substance and sugar-tolerance tests were repeated periodically. Originally these patients deviated in varying degrees from the normal, with a lowered basal metabolic rate, increased dextrose tolerance and a lowered blood cholesterol content. The Aschheim-Zondek test has not been positive in a single instance. A sufficient number of recent tests to indicate any

decisive changes have not yet been completed.

The most sensitive clinical indicators of testicular function are the seminal vesicles and the prostate gland. Carl R. Moore, Callow and Deanesly and McCullagh have called attention to the prompt atrophy of the prostate after castration. Experimentally, in castrated male animals the administration of androgenic agents elicits a prompt response in the increase in size of

the atrophic prostate and seminal vesicles.

The injection of testosterone propionate produced a change in the patients as definite and pleasing as anything in my experience. Ten mg. administered twice weekly has completely rehabilitated them. With two injections of 5 mg. twice weekly were sufficient. two, injections of 5 mg. twice weekly were sufficient. Increased strength and endurance, a desire to expand their work. their work, the appearance of libido, erections, ejaculations, ability to copulate and an increase in the growth of the beard have all been observed in their return to normality. After from three to six weeks return to normality. After from three to six weeks the prostate gland regenerates perceptibly, and it approaches the name of the prostate gland regenerates perceptibly. approaches the normal size in from six to eight months. One very religious patient, working as an orderly in a local hospital, threatened to discontinue treatment because of the appearance of annoying erections, and he would have deserted had it not been for the concomitant appearance of well being and ability to work comitant appearance of well-being and ability to work without extreme exhaustion. Foss reported that a castrate while receiving 140 mg. of testosterone in a week acquired priapism which was unrelieved by intercourse but abated several days after the dose had been diminished.

### TESTOSTERONE IN OINTMENT

About six months ago, on the suggestion of Dr. Carl R. Moore of the University of Chicago, testosterone has more recently reported on the potency of andro-Three of the castrated patients and two patients with cryptorchidism who were given testosterone ointment

ryptorchidism who were given testosterone ointment (each centimetre containing 2 mg. of free testosterone) and to the of 2 obtained with injections. With the application of 2 obtained with injections. With the application of 2 c.c. each day the dose applied to the skin was somewhat more than the injected amount. The total average weekly dose administered to the castrates was 20 mg. by injection and 28 mg. by inunction. Patients are directed to rub the ointment vigorously for twenty minutes into a hairless area of skin, preferably on the anterior abdominal wall. The application is made each day at bedtime.

Corroborating the good clinical outcome, proof of the absorption of the substance by the human skin was obtained through the demonstration of increased

androgenic activity in the urine.

The potency of many drugs administered through the skin by inunction is well known to the physician. Through the ages the treatment of syphilis rested mainly on the mercurial inunction because of its proved, prompt and prolonged therapeutic action. As evidence of absorption of the mercurial through the intact skin, toxic gingival, intestinal and renal manifestations frequently developed when proper reserve was not exercised in its administration.

Macht has recently reported the result of a long and careful study on the absorption of drugs and poisons through the skin and mucous membranes. He commented on the sound rationale underlying many of the older therapeutic procedures employing inunction, pointing out the benefits and dangers as well.

The problem in substitution therapy with testosterone is to arrange the administration so as to imitate the steady continuous activity of the normal glands and avoid alternation of deficiency and wasteful excess of the hormone. In an aintent the hormone is slowly and continuously available to the body. It is possible that this method of administration of androgens may have widespread acceptance. At any rate, for patients who have difficulty in reaching the physician it offers an effective form of treatment.

#### POSTPUBERAL CRYPTORCHIDISM

Two patients with postpuberal cryptorchidism, 23 and 32 years of age, have been treated. In both there was retarded development of the secondary male characteristics associated with atrophy of the testicles. Each patient had the appearance of a boy of 16 years, with small face, slender build, high pitched voice and no hair on the face or in the axillæ, with typical eunuchoid bodily form, with full hips and girdle distribution of fat, and with arm span greater than body height. The patient of 32 had a small amount of pubic hair. The penis was less than 2 inches in length and of very small calibre. After one year of treatment with antuitrin-S no change was observed. The patient married during this course of treatment and his efforts at intercourse were unsatisfactory. Eight months ago treatment with testosterone propionate was instituted in injections of 25 mg. twice weekly. The penis enlarged remarkably and in six months had more than doubled its size. Intercourse with well-defined orgasm is now being carried out three times weekly in a gratifying manner. The other patient, 23 years of age, has experienced a similar good result. In both patients the prostate gland has grown appreciably and axillary hair and a small amount of hair on the upper lip have appeared. The experience of Riches and more recently that of Vest and Howard demonstrates the need of larger maintenance doses for this type of patients, approximately double the dose used for castrates. Kenyon administered 25 mg. of testosterone propionate intramuscularly from five to seven times weekly for from twenty-eight to ninety-five days to four eunuchoids. Thereafter three of them received four eunuchoids. Thereafter three of them received from 10 to 25 mg. from three to seven times weekly, with interruptions for 152, 108 and 160 days respectively. In all instances there were an early increase in the frequency of erections and a marked increase in the size of the prostate as early as the twelfth day. The penis elongated from 1 to 2 cm. in all but one case. Changes in the hair of the face, pubis and thighs and deepening of the voice occurred promptly with the large dose used. Moreover, Kenyon observed nitrogen and sodium retention and a slight increase in the body-weight. body-weight.

Twenty-five mg. twice weekly proved in our cases to be the minimal dose for maintenance of well-being and continuance of gradual improvement.

A larger dose of ointment is also required for eunuchoids. Four c.c. of ointment (2 mg. per cubic centimeter) is applied daily. The total weekly dose reaches approximately 56 mg. of testosterone, which ompares with the injected dose of 50 mg. a week While the response to either method of administration occurs less promptly than in the castrate, the effect is no less definite. In fact the objective sign of penile growth offers a definite indicator of the effect. A reduction of dose results in a less satisfactory clinical

In this type of patient, as in the castrate, there is an unquestionable indication for endocrine therapy, because unmistakable deficiency is recognizable clinically and the reassuring response to treatment is readily observed.

In these two groups the effect of testosterone may be truly called rejuvenation. The physician may now humanely select and treat with testosterone these morbid semi-invalids with as much precision as he would use in treating with insulin patients with advanced diabetes. Testosterone may not contain all the components of testicular secretion, but it does control dramatically some processes associated with its deficiency.

#### SUMMARY

1. In castrated patients and in those with hypo-gonadism due to cryptorchidism the administration of testosterone brings about an effective substitution.

2. Beneficial results have been obtained through the intramuscular injection of testosterone propionate and equally good results through the inunction method with free testosterone in a greaseless base.

#### Reviews

THE ESSENTIALS OF MEDICAL TREATMENT.—By
David Murray Lyon, M.D., D.Sc., F.R.C.P.Ed.
1939. Oliver and Boyd, Limited, Edinburgh
(Tweeddale Court). Pp. xx plus 448. Price, 15s.

THE writer of a book on medical treatment always considers it necessary to apologize for his choice of subject, and he invariably gives as his reason for writing the book that treatment is a subject which is very badly neglected. This excuse has now worn very thin, for the reviewer has at least half a dozen books on medical treatment all published within the last two years, and the 'therapeutic nihilism' of the last century is now deeply buried under a formidable pile of volumes, good, bad, and indifferent. However, Dr. Murray Lyon's book is a good one and did not require any explanation or excuse. It has that executial quality readability and excuse. It has that essential quality, readability, and, though the text is not relieved by many illustrations, it has not been made unnecessarily heavy with tables and classifications.

The book is written very much from the practitioner's point of view, though from his remarks in the preface the author seems to have the needs of the under-graduate student primarily in his mind. There is nothing contradictory here, for the undergraduate student of to-day is the practitioner of to-morrow; we do not believe that this book will help the former to get through his examinations, but we are certain that it will help him to treat his patients when he is let loose in the world of general practice.

The first chapter is on febrile diseases, and begins with a description of the treatment of fever per se. Other subjects discussed are tonsillitis, rheumatic fever, typhoid, malaria, and septicæmia. The author has taken literally the dictum that cholera is a febrile disease and has included in this chapter. Successive chapters are on diseases of the various systems, on metabolic and ordering disorders on allowing diseases. metabolic and endocrine disorders, on allergic diseases,

and on diseases of the blood.

The author would have been wiser to have kept to his own personal experience and omitted such subjects as cholera, his treatment of which bears the stamp of pure transcription and is pretty poor at that; the emphasis laid on potassium permanganate betrays the source. 'For the initial diarrhea a dose of calomel may be given or some castor oil with laudanum'; we don't understand, or agree. 'Enemata of 2 per cent tannic acid have been tried at a later stage without much result'; then why mention it!

It is much easier to criticize than to praise, and we hope that these few criticisms will be fully discounted when we conclude by saying that this is a most valuable book which we can very strongly recommend to the practitioner and to the senior undergraduate student.

AVILL'S SYSTEM OF CLINICAL MEDICINE: DEALING WITH THE DIAGNOSIS, PROGNOSIS, AND TREATMENT OF DISEASE FOR STUDENTS SAVILL'S AND PRACTITIONERS.—Edited by Agnes Savill, M.D., and E. C. Warner, M.D., F.R.C.P. Eleventh Edition. 1939. Edward Arnold and Company, 1141. Pp. xxviii plus Illustrated. London. Price, 28s.

This book needs no introduction as its reputation is already established. The eleventh edition has been brought up to date, but is otherwise on the same lines

as its predecessors.

The reader is presented with an essentially clinical description of medicine which is very complete. Each chapter is divided into three parts. The first part describes the symptoms which may occur as a result of disease in an organ or area of the body. The second of disease in an organ or area of the body. The second discusses the physical signs and the third part gives a classification of the various diseases affecting that

Nineteen contributors, each a specialist in some branch of medicine, have revised the various sections of the book. In the face of such authority one hesitates to criticise. The chapters on case-taking and the external appearance of diseases contain much of interest which is unobtainable in the average textbook. Tropical anæmias have been rather briefly dealt with. The book is suitable for students and practitioners in India and should be especially useful when read in conjunction with clinical instruction

The volume is handsomely bound, and the coloured

plates add greatly to its success.

J. G.

NUTRITION AND DIET IN HEALTH AND DISEASE. By James S. McLester, M.D. Third Edition. 1939.
W. B. Saunders Company, Philadelphia and Price, 40s. London. Pp. 838.

This book was first published in 1927 and already has an established reputation, both in the United States and elsewhere. The author is a professor in a University in the southern states of North America where conditions regarding nutrition of the masses are more comparable to those in India, than they are in the northern states of America or in England and many European countries.

The scope of the book is a wide one. There are two major divisions of the subject-matter—nutrition in health and nutrition in disease; the first chapters are on the physiology of direction of are on the physiology of digestion and assimilation of food. The remainder of this section 'The need for food and its utilization' is made up of chapters on

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here are nutrition chapters lation of need for pters on

more detailed consideration of protein, the vitamins, the minerals, and other nutritional factors in dietary. The next section deals with food products, milk and milk products, meat, cereals, fruits, etc. The third section is on diet in health from infancy to old age send during special physiological states, such as section is on age and during special physiological states, such as

pregnancy.
The second half of the book, nutrition in disease, starts with a very important chapter on deficiency diseases. Then follow a number of chapters on diet in different diseases; there are separate chapters on important metabolic diseases such as diabetes and gout, lett others are grouped. e.g., diseases of the kidney. important metabolic diseases such as diabetes and gout, but others are grouped, e.g., diseases of the kidneys and urinary tracts, of the digestive organs, of the blood, of the skin, etc., nervous disease, endocrine disorders and febrile diseases. All these chapters make valuable reading for practitioners and specialists.

Finally, there is an appendix in which there are

numerous useful tables. Many American writers, although they may display a profusion of 'citations' from the literature, have an irritating way of ignoring the observations of workers in other countries. Even if one admits that the best work on nutrition is done in America, this trait shakes the confidence of the reader and detracts from the value of such writings. For example, to quote American work on stone in the kidney and vitamin-A deficiency from 1935 onwards and to make no reference to McCarrison's earlier work, or to ignore Nicholls' observations on phrynoderma seem inexcusable. Further, this isolationism occasionally leads them into trouble and is responsible for the suggestion that epidemic dropsy is identical with beri-beri, the principal symptoms of the former disease being explained away as possibly due to malaria or some other associated

However, the book is a standard work on nutrition and will be very useful to the practitioner, the sanitarian and the research worker.

ANTENATAL AND POSTNATAL CARE.—By F. J. Browne, M.D. (Aberd.), D.Sc., F.R.C.S. (Edin.), F.R.C.O.G. Third Edition. 1939. J. and A. Churchill Limited, London. Pp. xviii plus 622. Illustrated. Price, 21s.

ALTHOUGH antenatal care is not a panacea for all obstetric evils and although statistics do not show the beneficial results which might be expected from almost universal (in certain countries) antenatal supervision,

nevertheless the subject is one of great importance.

Professor Browne points out that the disappointing results obtained from antenatal work are often due to insufficient thoroughness and knowledge on the part of the medical attendant.

It behoves all obstetric practitioners to study this subject, especially so in this country with its high maternal and feetal mortality. Improvement in this direction must lie with general practitioners, at any rate outside the very large towns. Such practitioners. outside the very large towns. Such practitioners, lacking as they so often are in obstetric and antenatal training will find in Proceedings of the practice of the control training, will find in Professor Browne's book a splendid

reference work in this branch of their profession. Dealing as it does with the whole aspect of antenatal difficulties and dangers in a thorough and up-to-date manner, the third edition of this excellent book is of real value to obstetricians. Interesting and somewhat unusual chapters are those on heredity and on the influence of emotions upon pregnancy and parturitien.

influence of emotions upon pregnancy and parturition.

The author deals fully with the usual diseases, such as toxamias, pyelitis, tuberculosis, heart disease, the anæmias, venereal disease and tumours, as well as anæmias, pyentis, tuperculosis, neart disease, anæmias, venereal disease and tumours, as well as malpresentations and disease and tumours, as well as malpresentations, and more uncommon conditions, e.g., chorea, neuritis, skin diseases, and appendicitis. Abortion, moles, ante-partum hæmorrhages, retroversion and contracted pelvic are described fully.

and contracted pelvis are described fully.

There is one chapter devoted to the uses of radiology in obstations (or rather in obstetrics, whilst post-partum conditions (or rather sequelæ which follow the puerperium such as prolapse) included some useful postnatal physical exercises.

Finally there are several appendices setting forth forms for antenatal or postnatal records, the medical induction of labour, hints to expectant mothers, diets, hints on conduct of clinics and figures referring to results of treatment of placenta prævia.

Altogether this is a book to be strongly recommended to practitioners and one which will repay careful study.

K. S. F.

COMMON SKIN DISEASES.—By A. C. Roxburgh, M.A., M.D., B.Ch. (Cantab.), F.R.C.P. (Lond.). Fifth Edition. 1939. H. K. Lewis and Company, Limited, London. Pp. xxxi plus 416, with 8 coloured plates and 179 text-illustrations. Price, 15s.

This invaluable textbook on skin disease has become a biennial publication, and its popularity is such that even this does not meet fully the demands for the book, for the last edition had to be reprinted within a year. Despite this short interval since the last edition, considerable additions and changes have been made; illustrations have been replaced by better ones, and fourteen new ones have been added. Other changes have been the introduction of  $\tau$  units for x-ray dosage, but the older, less accurate, method of giving fractions of a pastille dose is retained as well.

The new chapter on the avitaminoses is perhaps a little too short. Frank avitaminosis is uncommon in England, with the exception of avitaminosis-D which does not give rise to any skin lesions as far as one knows, and the effect of minor degrees of hypo-vitaminosis is largely a matter of conjecture. This is not however the case in the east and the effects of specific malnutrition are much more apparent in practice in India, so that a little elaboration of this section would be welcome in this country. On the other hand, we think that the author is well advised not to add seriously to the size of his book by introducing purely tropical skin infections.

There is little new to be said about this concisely and clearly written and very well-illustrated book, which is in our opinion little short of the ideal book for the general practitioner; with the minor proviso indicated above, this remark applies with equal force in this

SURGICAL DIAGNOSIS.—By Stephen Power, M.S. (Lond.), F.R.C.S. (Eng.). 1939. John Wright and Sons, Limited, Bristol. Pp. 228, with 51 illustrations and 15 plates. Price, 12s. 6d.

Surgical diagnosis is not a new idea, but we do not know of any other short and concise book which deals with this subject exclusively and completely. Such a book will therefore find a definite place in students' and practitioners' libraries, provided of course that it is up to standard. We have no hesitation in saying that this book meets this requirement.

The chapter headings follow very much the usual lines of surgical textbooks; the first three are on bones, joints, and fractures and dislocations; then they become regional, the hand, the foot, etc.; and finally symptomatic; e.g., abdominal pain in children and hæmaturia. The text is kept strictly to diagnosis. In each chapter, after a few introductory remarks on general considerations and methods of examination the condi-

considerations and methods of examination, the condiconsiderations and methods of examination, the conditions that are likely to be encountered are taken up one by one and dealt with concisely; there is seldom more than a single page devoted to any subject and more often less. The headings of the paragraphs are clear and relevant; this makes the book very valuable for quick reference. There are many text-figures and plates; these all help to make the subject clear and easy to understand especially as the illustrations had easy to understand, especially as the illustrations have the merit of showing exactly what they are meant to

It is a book that we can very strongly recommend to the house-surgeon; he will find it an invaluable book of reference, both now and later when he is in practice.

MANUAL OF UROLOGY.—By R. M. Le Comte, M.D., F.A.C.S. Second Edition. 1939. The Williams F.A.C.S. Second Edition. 1939. T and Wilkins Company, Baltimore. Tindail and Cox, London.) Pp. v pl 55 illustrations. Price, 18s. (Baillière, Pp. v plus 295, with 55 illustrations.

This book was originally intended to provide a simple introduction to urology for the beginner. The second edition presents many useful new features which widen its scope. The book has been entirely revised and made up-to-date with additions on the neuro-muscular physiology and pathology of the bladder. There is also a new chapter on impotence and sterility which will be found useful by the general practitioner. The printing, get-up and illustrations are all good. There is an excellent bibliography, which will be of use to the more advanced student. There is little doubt that the new edition will meet with a ready recention.

that the new edition will meet with a ready reception.

A TEXTBOOK OF GENERAL BACTERIOLOGY.—By E. O. Jordan, Ph.D. Twelfth Edition. 1938. W. B. Saunders Company, Philadelphia and London. Pp. 808, with 197 illustrations. Price, 25s.

The science of bacteriology has made very rapid progress within the last decade, so much so that it is no longer confined within the limited field of study in the medical curriculum. The systematic study of bacteriology is now a separate subject by itself, a counterpart of botany and biology, and it is for this reason that practical work in a laboratory is just as

important as the progressive theoretical knowledge. In the present volume, Professor Jordan has combined the most up-to-date conceptions in bacteriology with useful practical hints and directions for an efficient working of the laboratory. The entire book of 44 chapters offers very pleasant reading and some of the more difficult aspects of bacterial variation and antigenic relationship have been dealt with in a very comprehensive and lucid way. The classification of the Bacterium into three main types, namely, Bacterium, Salmonella and Eberthella stabilizes many controversial and sometimes needlessly confusing sub-groups. The chapter on virus diseases includes lymphocytic choriomeningitis and recent work on virus proteins. The last five chapters are devoted to industrial and agricultural bacteriology, namely, the bacteriology of milk and milk products, bacteria and the nitrogen cycle, bacteria in the industries, the bacteria of air, soil, and water, and the bacterial diseases of plants. An exhaustive bibliography is appended as footnotes to the text.

The book is an invaluable addendum to any bacteriologist's library.

K. P. B.

BACTERIOLOGY FOR MEDICAL STUDENTS AND PRACTITIONERS .- By A. D. Gardner, D.M., Edition. 1938. F.R.C.S. Second Oxford Milford. versity Press, London, Humphrey Milford. Pp. 274. Illustrated. Price, 6s. Obtainable from Oxford University Press, Bombay and Calcutta

This little volume of only 266 pages can verily be called bacteriology in a tabloid form and both students and busy practitioners will find in it all the most up-to-date and essential information on the subject condensed into a very small compass. The book is something more than 'notes on bacteriology', but less exhaustive than a textbook and it is this happy mean which is so useful for students generally and examined which is so useful for students generally and examinees in particular. The practical portion is completely left out and so is the Kauffmann-White scheme of antigenic structure of the Salmonellas, much to the relief of the beginners in bacteriology. For the sake of clarity ultra-microscopic agents, viruses, bacteriophage and border-line organisms have all been dealt with in one chapter. The reading and pen-and-ink sketch diagrams constitute a new departure in the style of getting up a scientific book and Professor Gardner is to be warmly congretulated on this small but extremely to be warmly congratulated on this small but extremely serviceable book.

K. P. B.

ELECTRIC EXCITATION OF NERVE. By Bernhard Katz, M.D. (Leipzig), Ph.D. (Lond.). 1939. Oxford University Press, London, Humphrey Milford. Pp. ix and 151, fig. 31. Price, 10s. 6d. Obtainable from Oxford University Press, Bombay

In this monograph, Dr. Bernhard Katz of Leipzig, Germany, now a Beit Memorial Research Fellow working in the laboratories of Professor A. V. Hill, F.R.S., in London, has presented an excellent and readable review of the present status of our knowledge of the electrical phenomena in nerves and the problems of nerve excitation. The review, as the author has stated in excitation. The review, as the author has stated in the preface, was originally drawn up in response to an invitation from the editors of the 'Ergebnisse der Physiologie' but could not be published there as the manuscript was refused on 'racial' grounds by the manuscript was refused on 'r prospective publisher in Berlin.

The Oxford University Press has done a great service to all those who are interested in neurophysiology and electrophysiology by publishing the review of Dr. Katz. In such a highly technical field as electrophysiology, the writing of a clear but concise review of recent developments is no mean achievement and Dr. Katz has certainly handled the subject-matter with the tact and judgment of a sound teacher and investigator.

The book is divided into five main chapters. Starting off with some of the fundamental observations regarding the stimulating efficacy of electric currents, the author has discussed all the recent experimental work, with figures and diagrams wherever needed, of the events which follow the application of an electric stimulus to a nerve, the temporal and spatial progress of the events which lead to excitation and its continuous self-propagation along the nerve. The theoretical inter-pretations and deductions of many experimental data have also been included. In the concluding section, the author sums up the conflicting arguments by saying that 'an essential part in these events (nerve stimulation) is the flow of electric current normal to a cylindrical electrically-polarized membrane, and the removal of its resting charge'. It seems, and the author also agrees, that there are still considerable gaps in our knowledge of the true physico-chemical nature of the 'excitation' phenomenon in peripheral nerves, although, adequate explanations appear to have been offered for the strength-duration curves and a variety of related experiments in terms of the two time-constants of 'excitation' and 'accommodation'. Further work in the physico-chemical field has been recommended by the author for the elucidation of the complex changes that precede the propagation of an

This book is well got-up and has a rich bibliography which should be useful to other workers in the field.

B. M.

ANATOMY OF THE NERVOUS SYSTEM: FROM THE STANDPOINT OF DEVELOPMENT AND FUNCTION.—By S. W. Ranson, M.D., Ph.D. Sixth Edition. 1939. W. B. Saunders Company, Limited, Philadelphia and London. Pp. 507, with 382 illustrations. in colours, 382 illustrations, some of them Price, 27s. 6d.

THE sixth edition of this well-known book is presented in a finely-bound volume, printed and

The author covers a very large field, commencing as he does with the origin and function of the nervous system as illustrated first by coelenterates, then dogfish the human embryo and for the nervous applications. the human embryo and finally coming to the complex

development of the human nervous system.

So clearly and methodically is the development worked out that the reader can follow the thread without any difficulty from beginning to end, aided by the particularly helpful illustrations, of which there are

a great number.
Following these chapters on development, the devited anatomy of the brain and nervous system is dealt with

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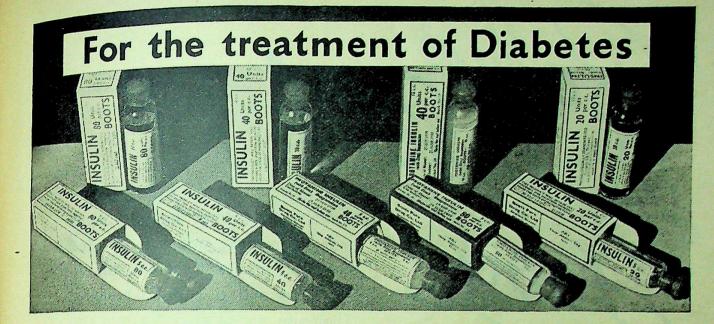
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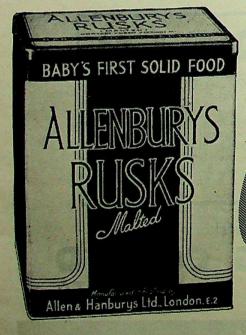
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including all the most recent work in this line, especially as regards the thalamic nuclei.

The reader's attention is held throughout, owing the to the author's aim to present the necessity.

The reader's attention is held throughout, owing largely to the author's aim to present the nervous system in its relation to the living organism. The B. N. A. nomenclature has been used throughout with few exceptions. Some of the spinal tracts have been renamed and the old and B. N. A. nomenclature

given in brackets. It is doubtful whether this is really an improvement.

The book is well written and is a pleasure to read. It contains an extensive bibliography at the end. It can be confidently recommended to all who are interested in the study of the nervous system.

J. G.

## Abstracts from Reports

BENGAL PUBLIC HEALTH REPORT FOR THE YEAR 1937. BY LIEUT.-COL. A. C. CHATTERJI, M.B., D.P.H., I.M.S., DIRECTOR OF PUBLIC HEALTH

During the year under review, the death rates from dysentery and diarrhœa, respiratory

Twenty-seven thousand, nine hundred and forty-four deaths were due to smallpox in the province in 1937 against 46,276 in 1936, yielding a death rate of 0.6 per mille against 0.9 in 1936 and 0.3 the mean of the previous quinquennium.

The total number of deaths reported from dysentery and diarrhea in 1937 was 56,800 with a death rate

Fever deaths in 1936 and 1937

Causes	Number		DEATH RATES PER MILLE		Percentage of increase + or	PERCENTAGE TO TOTAL FEVER MORTALITY	
	1936	1937	1936	1937	decrease — in 1937	1936	1937
Malaria fever Enteric fever Measles Relapsing fever (spiro-chætal)	337,647 8.359 4,549 7	372,992 8,978 4,875 2	6.8 0.17 0.09 0.0001	7.5 0.18 0.10 0.00004	+10.3  +5.9  +11.1  -60.0	47.1 1.2 0.6 0.001	48.1 1.1 0.6 0.0003
Kala-azar Influenza Cerebro-spinal fever Typhus fever Blackwater fever Other fevers	21,161 2,502 910 1,551 115 339,341	21,227 2,422 938 2,814 229 361,109	0.42 0.05 0.02 0.03 0.002 6.8	0.42 0.05 0.02 0.06 0.004 7.2		2.9 0.3 0.1 0.2 0.02 47.4	2.7 0.3 0.1 0.4 0.03 46.5

injuries were the same as in the preceding year. There was reduction in the comparative rates in cholera and smallpox but in fevers and all other causes the rates

of 1.1 per mille against 57,212 with the same death rate in 1936. The death rate increased by 10 per cent against the last quinquennial average (1.0 per mille).

#### Respiratory diseases

Diseases	Number		DEATH RATES PER MILLE		Percentage of increase + or	PERCENTAGE OF TOTAL DEATHS FROM RESPIRA- TORY DISEASES	
	1936	1937	1936	1937	decrease —	1936	1937
Pneumonia Pulmonary tuberculosis Whooping cough Other respiratory diseases	49,155 15,266 1,247 29,149	48,927 14,668 1,519 31,872	0.98 0.31 0.02 0.58	0.98 0.29 0.03 · 0.64	$ \begin{array}{c} \pm 0.0 \\ - 6.5 \\ + 50.0 \\ + 10.3 \end{array} $	51.8 16.1 1.3 30.7	50.4 15.1 1.6 32.9

were higher than those of the previous year. There was no death from plague in the presidency during the by 3.1 per cent in 1937 as against an increase of Cholera.

Cholera accounted for 32.710 deaths in 1937 yielding a death rate of 0.7 per mille against 76,100 deaths with showing a decrease as large as 53.3 per cent over the of the previous quinquennium (1.0). 2.6 per cent of the fotal provincial deaths in 1937 were due to cholera.

ANNUAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE PROVINCE OF ASSAM FOR THE YEAR 1938. BY COLONEL E. S. PHIPSON, C.I.E., D.S.O., M.D., F.R.C.P., I.M.S., INSPECTORGENERAL OF CIVIL HOSPITALS

FROM a detailed study of the working of the hospitals and dispensaries in this province, covering a period of rather more than eighteen months, I have arrived at certain conclusions which I now record.

The working of the hospitals and dispensaries in this

province is handicapped to a serious extent in two

ways: firstly by the lack of nurses, and secondly by

the lack of skilled medical attention.

The hospitals and dispensaries are, on the whole, reasonably well built and equipped, and many have excellent operating rooms, women's wards and special wards for private patients provided, it may be, by local benefactors, and yet comparatively little of the accommodation and facilities provided can be used for the purposes for which they are really intended because of the lack of trained nursing.

A subdivisional medical officer must of necessity think twice before he admits a serious medical case when he knows that the attention a case can receive at night is probably limited to the care that an overworked compounder can give, and he knows he is taking a definite and sometimes unjustifiable risk when he operates, except from sheer necessity, in the absence of that skilled after-care which so often makes the difference between success and failure in surgical work. It is largely due to this, that surgical work in State and Local Board hospitals comprises so few 'selected' cases, a group which includes those cases in which relief is sought, but not urgently and imperatively required, and which, in properly staffed hospitals, ought to comprise the majority.

The solution to this problem lies, I think, in the practical recognition, by Government, by local bodies and by local benefactors, that the efficiency of a hospital is determined not only by the quality and sufficiency of its buildings and equipment, but also by the quality and sufficiency of its personnel, and that trained nursing is as much a part of a hospital unit as are doctors. Given the necessary funds, there should be no great difficulty in establishing a training school for nurses at the Dibrugarh Civil Hospital, and if suitable hostel accommodation is provided for them, there is good reason to believe that young women of the province, of the necessary educational standard, would be willing to come forward and undergo the course of training necessary to fit them for the career of a trained nurse in the hospitals

of the province.

I have stated above that the other main defect is the lack of skilled medical attention. There are two main reasons for this: one is that, owing to financial stringency, the opportunities for self-improvement in a wider field which were formerly given to officers in the Assam Medical Service, on whose shoulders falls the bulk of the responsibility for medical relief of the people, have been denied to them for many years, and post-graduates study, which is universally recognized as an essential condition of medical efficiency, is now in abeyance without any apparent hope of resuscitation, with the inevitable consequence that the standard of deteriorating. This is the more unfortunate when it is remembered that the Assam Medical Service, and particularly the senior branch of it, has the prospect of greater opportunities in the future than at any time in the past; and yet there are few indeed who are fitted for them, through no fault of their own.

The second reason for the lack of skilled medical attention (from the patient's point of view) is the constant and at times almost overwhelming pre-occupation of Government executive medical personnel, including civil surgeons and subdivisional medical officers, with duties, whether administrative, clerical or supervisory, which are encroaching in ever-increasing volume on the time during which the medical enceits actually able to function in a purely medical enceits. actually able to function in a purely medical capacity, that is, in the healing of the sick. This is not to say that these duties are superfluous; they are, on the contrary, part of the necessary machinery of Government and departmental posterior ment and departmental routine as at present organized, but I am convinced that if greater efficiency in actual medical relief is to be sought, the burden ought to be lightened or at least redistributed.

Kala-azar There were 8,775 cases and 112 deaths, against 6,712 and 66 deaths in 1937.

The following figures for the last eight years show the numbers treated in hospitals and dispensaries other

than those directly under the Public Health Depart. ment:-

1931	3,755	1935	 5,476
1932	3,696	1936	5,327
1933	4,443	1937	6,712
1934	 5,558	1938	8,775

The number of patients treated during 1938 was larger by 2,063 than that of 1937. The increases occurred in the Sibsagar, Sylhet, Cachar, Nowgong and Kamrup districts.

These figures call for more than passing notice.

Allowing for the fact that during the past two years local surveys have been intensified, which would have the effect of bringing forward for treatment a number of cases which otherwise might have been undetected, the steady increase in cases treated in hospitals and dispensaries must be regarded as significant, the more so when it is recognized that the cases treated by the Public Health Department dispensaries show a corresponding increase, and still more so when the increase in kala-azar incidence in this province is considered in relation to the recent great increases reported in the incidence of the disease in Northern Bengal, Sikkim and the northern districts of Bihar. All these indications suggest the likelihood that the incidence of kalabefore long, again assume epidemic may, proportions.

This is a prospect that cannot be regarded with complacence, since the unpalatable truth confronts us that, in spite of the huge sums, in the aggregate over 47 lakhs of rupees, spent on kala-azar in the last nineteen years in Assam, in no instance has the disease been stamped out from where it obtained a freetheld in the 1007 with the control of foothold in the 1925 epidemic; that no effective means of prevention, based on the true epidemiology of the disease, has yet been devised, and that in the present disease, has yet been devised, and that in the present state of our knowledge we are almost powerless to prevent its spread, except by treatment. This method although it is highly effective and although the medical personnel are highly organized and trained in its employment, is costly and ignores the earlier and perhaps the most vital links in the chain of causes which culminate in the infection of the individual. Briefly, we can cure an infection, once established, with great precision but we cannot prevent its with great precision, but we cannot prevent its occurrence. It is in the attempt to fill the dangerous gaps in our knowledge of the disease, that the Indian process of the disease, that the Indian process of the disease is the state of the disease. Research Fund Association have recently authorized a special enquiry into improved methods of prevention and into the mode of transmission of the disease and the Government of Assam have been invited to contribute to the cost of the enquiry.

#### CHEMICAL NNUAL REPORT OF THE CHEMI EXAMINER TO THE GOVERNMENT ANNUAL MADRAS FOR THE YEAR 1938

The total number of human poisoning cases examined during the year was 467 with 2,485 articles as compared with 426 cases with 2,427 articles in 1937. Poison was detected in 241

detected in 241 cases or 51.6 per cent.

Datura heads the list this year with 36 cases followed.

There by oleander with 30 and opium with 29 cases. were 14 cases of madar juice poisoning. Cases of poisoning with organic poisons were nearly twice as frequent as those with inorganic poisons. Among the inorganic poisons, mercury claimed 21 cases, arsenic inorganic poisons, mercury claimed 21 cases, arsente 20, copper sulphate 12, cyanide 10 and nitrite 9. Was a marked increase in datura and nitrite cases.

#### INTERESTING CASES

Potassium bichromate.—There are certain mendicants in this country who go about trying to impress people with their supernatural powers by undertaking swallow anything from prickly-pear to poison. A map probably of this type, came to a village and swallowed daily for some days about an ounce of sulphur drinking his own urine as 'antidote'. As the villagers did not Depart-

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6,712 8,775

was larger curred in Kamrup

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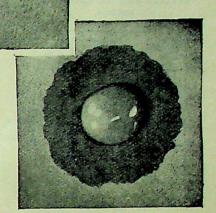
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# A Triumph of Emulsification



THE OILY RING AROUND THIS DROP TELLS THE STORY

The ring around the drop tells the story. A drop of Agarol on blotting paper holds firmly together. Try this with a poor emulsion and you will soon see the mineral oil being taken up by the blotting paper, forming a greasy ring around the drop. For dependable efficacy in the treatment of constipation and allied disorders Agarol - mineral oil, agar-agar and phenolphthalein emulsion—has attained a reputation all its own.

Only the finest and purest ingredients are used in Agarol. Its exceptional palatability, secured without artificial flavouring, renders it acceptable to both children and adults. Agarol contains no alcohol and no alkali and, being devoid of sugar, is particularly suited

to diabetic cases.

A trial supply to Physicians on request.

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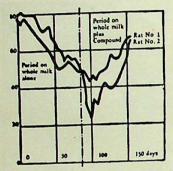
Also at Bombay, Madras, Karachi and Rangoon.

Prepared by WILLIAM R. WARNER & CO. LTD., LONDON, ENGLAND.



# Anæmia yields readily

Results of experiments devised to determine the potency of Waterbury's Compound as a hæmoglobin restorative in nutritional anæmia.



Hæmoglobin count using the Dare Hæmoglobinometer and scale. Sample taken from tail artery.

85th day,period when supplementing with Waterbury's Compound was begun.

# TO WATERBURY'S COMPOUND

Anæmia is probably the most frequent after-effect of disease. and the most persistent. It will yield readily to intensive treatment with Waterbury's Compound.

This preparation contains fresh liver, spleen and cod liver oil. acted upon by digestive ferments for easy absorption and assimilation.

Waterbury's Compound is also supplied with Creosote and Guaiacol to make it more efficient at those seasons when coughs, colds, and respiratory ills need special attention and care.

May we send you a bottle of each form of this very palatable and dependable hæmatinic and reconstructive to form your own conclusions?

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Mercantile Buildings, Lall Bazar, CALCUTTA. Also at Bombay, Madras, Karachi and Rangoon.

Made by Waterbury Chemical Co. Inc., New York and St. Louis, U.S.A.

CAL-BIS-MA-CAL-BIS-MA-CAL-BIS-MA-CAL-BIS-MA

# Gastric Hyperacidity

In the relief of gastric hyperacidity, speed is essential—Cal-Bis-Ma provides it. The neutralizing effect should be prolonged so as to prevent secondary acid rise—again Cal-Bis-Ma takes care of that. The irritated gastric mucosa should be soothed and protected from further irritation that, too, is an important mission of Cal-Bis-Ma.

Send for a trial supply and descriptive literature.



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seem impressed with this show, he swallowed one day seem impressed with this show, he swallowed one day in their presence a substance stated to be 'red sulphur' and drank the usual 'antidote'. He collapsed and was removed to a hospital where he died one hour after swallowing the poison. We detected in his viscera chromium equivalent to about three hundred and twenty-nine grains of potassium bichromate and we found the remnants of the 'red sulphur' to be potassium bichromate weighing about three hundred and forty-two grains.

forty-two grains. Cyanide.—An immoral wife had a child who was in the habit of eating out of the same dish with her husband. She left the child with her relations one morning and served to her husband food mixed with morning and served to the historian food linked with poison that night. After eating a few morsels he collapsed and died in about twenty minutes. The woman threw the remnants of the food outside the house where a stray dog devoured them and died almost immediately. The villagers promptly informed almost immediately. The villagers promptly informed the police who sent us the viscera of the man, the viscera of the dog and the remnants of the suspected poison seized from the woman. We detected cyanide in the viscera of the man as well as in the viscera of the dog and we found the remnants of the suspected poison to be potassium cyanide. The woman stated at hor trial that she had administered the substance as at her trial that she had administered the substance as a 'love potion' to her husband. She was awarded the extreme penalty of the law.

Chloroform.—A young man was brought to a hospital in an unconscious state with dilated pupils and stertorous breathing, the breath smelling strongly of chloroform. He died five minutes after admission. In his pocket was a letter in which he stated that he had swallowed chloroform to end his life. We detected about fifty-seven grains of chloroform in his viscera.

Sulphonal.—A man presumably wanted to go to heaven by motor car. He got into his car and before starting, swallowed from a tumbler a hypnotic drug mixed with water. He then drove on till the drug had its effect and the car hit a telegraph post. The had its effect and the car hit a telegraph post. car was wrecked but the driver escaped injury, though the effects of the hypnotic lasted for two days. The police found a tumbler in the wreckage of the car and sent it to us. We detected sulphonal in the contents of the tumbler.

Datura.—A quack gave his patient a paste of leaves as a remedy for guinea-worm. The unfortunate patient became unconscious and died. We detected partials of data unconscious and died. particles of datura leaf in the contents of the stomach of the victim.

Malai vembu (Melia Composita Willd.).—A man drank the juice of the bark of 'malai vembu', vomited once and died within about an hour and a half. The viscera, the vomit and a specimen of the bark were sent to us. We did not detect poison in the viscera but we obtained from the vomit a crystalline poisonous acid ether. acid ether extract resembling the poisonous acid ether extract obtains the book. The extract obtained from a specimen of the bark. The acid ether extract obtained from each produced convulsions and death in frogs similar to those produced by picrotoxin. Each of the extracts gave with a dilute by picrotoxin. Each of the extracts gave with a dilute solution of benzaldehyde in absolute alcohol and a drop of concentrated sulphuric acid (Melzer's test) a permanganete sulphuric acid melzer's test) a permanganate purple colour, whereas picrotoxin gives a red colour. Further, the above two extracts did not give any colour on treatment with potassium nitrate acid and mixing with excess of solid caustic potash, whereas picrotoxin gives a brick red caustic potash, whereas picrotoxin gives a brick red colour with the test. The extract from the bark does not reduce Fehling's solution either before or after treatment with emulsion or hydrochloric acid.

treatment with emulsion or hydrochloric acid. Jungle potato (Manihot utilissima).—The 'jungle otato' is stated to be in extensive use in Malabar and Cochin cated to be in extensive use in Malabar and Cochin as a food, and according to local information there are stated to be two varieties, one poisonous the other stated to be two varieties, any appreciable and the other non-poisonous, without any appreciable difference between the two, except that the poisonous variety is darken with its leaves redder and cooks less variety is darker with its leaves redder and cooks less soft than the non-poisonous variety. According to the local medical effect than the non-poisonous variety. local medical officer there have been instances of goats dying after eating the leaves of the poisonous variety

but no instances are known of human beings having been poisoned by eating the cooked root of the poison-

A woman and two children were stated to have died after eating the uncooked 'jungle potato'. Their bodies were in a state of advanced decomposition. The examination of the viscera which were sent to us did not reveal cyanide or other poison. The root which was suspected to have caused death was also sent to us. We identified it to be Manihot utilissima. When the fresh root was crushed and distilled after acidifying with phosphoric acid, hydrogen cyanide was detected in the distillate, the total quantity of hydrogen cyanide corresponding to about fourteen parts per hundred thousand parts of the root. The poisonous nature of this root would therefore appear to be due to the presence of a cyanogenetic glycoside. About a pound of the root eaten in the raw state would probably prove dangerous to human life.

# THE REPORT OF THE CHEMICAL EXAMINER TO GOVERNMENT, PUNJAB, FOR THE YEAR

This year 4,095 cases were examined as compared with 3,871 in the year 1937, giving a net increase of 224 cases. The exhibits examined, however, showed a decrease of 190 from 11,905 in 1937 to 11,715 during the year under report, but this is accounted for by the smaller number of samples of cocaine received for examination. As usual the increase in cases was mainly in the number of 'stain cases'. Human poisoning and cattle poisoning showed a substantial decrease. The percentage of detection showed an increase under all human poisoning, cattle poisoning and blood-stain cases. Opium, datura, arsenic and alcohol were, as usual, the principal poisons used in cases of human poisoning; while in cases of cattle poisoning the poisons used were arsenic and strychnine only. Lahore was again responsible for the largest number of human poisoning cases (69) followed by Delhi (39), Phillaur (30), Amritsar (29) and Ferozepore (21); while most of the cattle poisoning cases were received from Lahore Cantonment, Rawalpindi and Lahore, viz, 11, 10, and 8,

of the 2,406 articles examined under the head rest included 72 samples of drugs sent by the Medical Store Depôt, 59 samples of ghee, of which only 27 were found to be fit for human consumption and 23 samples of water, of which 18 were found to be fit for drinking

During the year under report a three months' course of lectures by the Chemical Examiner to police inspectors has been inaugurated. It is hoped that this training will help them in estimating medico-legal evidence more scientifically at the scene of a crime and in selecting and despatching material for further examination.

#### REPORT OF THE TO GOVERNMENT, PROVI ANNUAL EXAMINER TO GOVERNMENT, UNITED PROVINCES AND CENTRAL PROVINCES, FOR THE YEAR 1938

#### HUMAN POISONING

THE total number of cases examined under this head was 427. Poison was detected in 67.0 per cent of cases as against 63.9 for 1937. The work was done more efficiently than would be apparent from these figures. A large number of unsatisfactory cases are sent up for examination every year and the paragraph 868 of the Manual of Government Orders often remains a dead letter. The forwarding officers should be directed to be more careful and to send for investigation only those cases where there is reasonable ground for suspecting that poison may have been the cause of death.

Datura was again the most commonly used poison.

It was detected in 31.8 per cent of the detected cases.

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Opium, arsenic, aconite; mercury, bhang, cyanides, alcohol, and nux-vomica (strychnine) came in order of frequency forming 27.2, 21.0, 3.8, 2.8, 2.4, 1.4, 1.2, and 1.1 per cent respectively of the detected poisons. Other inorganic poisons were detected in 2.4 per cent of the detected cases and other organic poisons in 49 per cent of the detected cases. 4.9 per cent of the detected cases

In 2.1 per cent of cases (26 articles), unidentifiable organic poisons were found. This shows the need for

research on the indigenous vegetable poisons.

In 214 cases, including seven cases of abortion, viscera were received. Poison was detected in 60.3 per cent of these cases as compared with 57.5 per cent for the year 1937. This low percentage of detection is mainly due to the fact that a large number of cases were received in which the cause of death was other than poisoning. In 62 cases the death was obviously due to causes like drowning, serious multiple injuries, hanging, snake bite, fracture of skull, strangulation, heart failure, prolonged illness and pneumonia. Excluding the above the percentage of detection was 84.9 as compared with 85.4 for the year 1937.

In 42 fatal cases no post-mortem report was received and in 102 cases in which post-mortem reports were received no definite opinion was given as to the cause of death. In 31 cases two or more reminders had to be sent for the post-mortem reports. In 13 cases, traces of extraneous mercury were detected in the stomach washes and in 11 cases manganese was detected in the stomach washes, obviously because of the neglect of the directions given in circular no. 293 of 1936, dated

the 11th November, 1936.

#### ANNUAL REPORT ON THE BERRY-WHITE MEDICAL SCHOOL, DIBRUGARH, FOR THE YEAR 1938-39

THE number of sanctioned beds has remained the same as in the last report (131) and the daily average of in-patients has risen from 98 to 110. This number is still far below what it should be in relation to the number of students.

The school staff has been slightly strengthened by the appointment of a laboratory assistant who has passed the I.Sc. Examination of Calcutta University, but the facilities for the teaching of practical chemistry

and physics are in great need of improvement.

Lieutenant-Colonel Allen reports an increase in the number of labour cases conducted in the hospital from 46 to 50, and that the number of cases of diseases of women treated has increased from 139 to 391, an increase of nearly 200 per cent. This is attributed to increase of nearly 200 per cent. This is attributed to the increasing popularity of the Narsingdas Jallan Maternity and Gynæcological Wards, and this is a very satisfactory feature of the report.

The number of microscopes remains the same as last year when the stock was re-inforced by the purchase of twenty new ones, but still more are needed.

An important innovation during the year under report was the admission, for the first time, of female students. In the past Government have provided for the medical education of a certain number of female students by the grant of scholarships tenable at the Campbell Medical School, Calcutta, at an annual cost of about Rs. 3,859. At first glance it appears reasonable, as a measure of economy, to save the greater part of this large sum by abolishing the scholarships tenable in Calcutta and substituting scholarships tenable at the Berry-White Medical School. As matters stand, with no hostel accommodation of any kind, there can be very few female students who, unless they have relatives in Dibrugarh, could make arrangements which would be satisfactory to their parents and the condition imposed must inevitably act as a bar to the acceptance of a scholarship or a seat by a student who might otherwise

be in every way eligible to undertake the course.

Funds did not permit of any of the long list of necessary improvements being taken in hand during the past year, and the current year's budget allotments will permit of very few of the school's long-standing

requirements being met.

ADMINISTRATION REPORT OF THE DIRECTOR OF MEDICAL AND SANITARY CEYLON, FOR 1938 SERVICES

THE Malaria Control and Health Scheme during 1938 continued to operate in the same areas as in 1937

During the year under review the work of all the Buring the year under review the work of all the groups has functioned on one basis, viz, that of the health unit. This was made possible by smaller areas being assigned to both district medical officers of health and field medical officers.

A new departure is the placing of the dispensaries in charge of apothecaries under the supervision of medical officers of health and field medical officers. Dispensaries are field institutions dealing chiefly with malaria and ankylostomiasis and by right should come under the supervision of the health staff whose two chief problems are these diseases. By this procedure it is proposed to change the functions of the dispensary from a place for the mere dispensing of medicines to a centre for all rural health work of the area. It will be a centre for health propaganda and for conducting various types of clinics, such as ante-natal and baby welfare, school clinics, parangi clinics in centres where the disease occurs, and venereal disease clinics. Special

emphasis is being placed on the effective treatment of malaria with all available drugs.

A type of work that has been developed during the year for villages in backward areas is for the medical officer of health or field medical officer of the area to visit them once a month, look up all expectant mothers, infants, pre-school and school children and attend to any conditions that need advice and attend to any conditions that need advice and treatment. Treatment for malaria, hookworm and yaws is given and those needing hospital attention are referred to the nearest hospital and the village headman makes himself responsible for seeing that they go to hospital. The transport of expectant mothers and Government funds. destitute cases are met from Instructions are left for any treatment before the next visit, to be obtained from the nearest dispensary. Steps are also taken to educate them in health matters by visits to homes, talks, and lantern and cinema shows. The people are encouraged to keep their gardens clean, to store their refuse in pits, to boil ther drinking water, to develop a vegetable garden, to provide windows for their houses and to get rid of mosquito-breeding places. After their confidence has been secured by relieving them of some of their physical handicaps through treatment, the construction of latrines is undertaken. If taken up earlier the response may not be satisfactory. The people are getting interested in this type of work.

With the establishment of cottage hospitals the policy that is being followed is for the medical officer in charge to be given an area around the hospital for health work as well. The sanitary assistants and midwives in these areas are placed under the supervision wives in these areas are placed under the supervision of the medical officer. This same policy is being followed in the case of the smaller hospitals and dispensaries in charge of medical officers. During the year, work on this basis was established at two cottage hospitals, one small hospital and one dispensary. hospitals, one small hospital, and one dispensary.

Control of soil pollution received adequate attention during the year and 27,244 latrines (21,792 in 1937)

In the provision of protected water supplies 61 ner public wells and 746 private wells were constructed and 7735 wells were were built.

3,735 wells were improved.

There have been nine cases of human plague, lowest number in any year since the introduction of the disease into Ceylon. There have been no outbreak in the provinces. The last case of plague occurred as well as rat plague for a continuous period of the same of the s as well as rat plague for a continuous period of for months and seven days. This freedom is assigned the energetic measures taken in fumigating all gran and contact cargo arriving from plague infected ports. and contact cargo arriving from plague-infected p There have been no cases of cholera or smallpox, when they occur are introduced from India. incidence of typhoid and dysentery continues to tain its high level. Two thousand two hundred and two RECTOR ERVICES,

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# The Influence of Virol on the Growth of Children

A Summary of Investigations\* published in the "Medical Officer," March 30 and April 6,1935

NUMBER of children, all receiving their customary home diet, were given either No Supplement, Cod Liver Oil, Halibut Liver Oil (with milk to provide equal calories) or Virol. The experimental scheme provided that each child should have a period on each treatment in turn, in such a way that every possible sequence was included. Rigid statistical control was thus possible.

Gain or Loss in Weight on Various Supplements:

Π,						
	Supplement	Total gain in ozs. over all periods	Average gain per child per week in ozs. over all periods	Total loss in ozs. during summer period only	Average loss per child per week in ozs. during summer period only	
	No Supplement	88	0.3	— I03	<b>— 1.4</b>	
	Cod Liver Oil	287	1.0	<b>— 77</b>	- 1.1	
	Halibut Liver Oil with milk	333	1.2	— 184	— 2.6	
	VIROL	762	2.6	_ 7	- 0.1	

Whereas earlier investigations had shown that the mere addition of vitamins had no effect on growth, these investigations have conclusively proved that Virol—a balanced food containing all the necessary vitamins—has a definite and remarkable effect in bringing the rate of growth up to the recommended standard. Virol was the only one of the supplements used that promoted this ideal rate of growth.

Virol was the one and only preparation that maintained the children's weight in the hot weather.

<sup>\*</sup> The full report will be sent on application to Messrs. A. H. Wheeler & Co., Sudama House, Wittet Road, Ballard Estate, Bombay.

# ST. BARTHOLOMEW'S HOSPITAL

OPERATION TABLE

with the

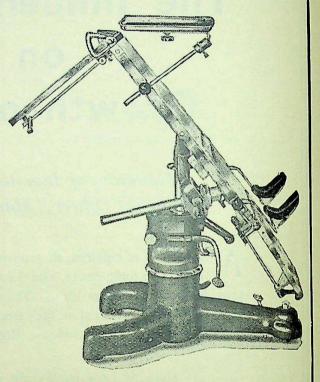
## Latest Improvements

including

Easy to operate Release Lever for lowering the table; Trendelenburg position increased to 55° tilt; Foot operated rubber-covered Floor Brake.

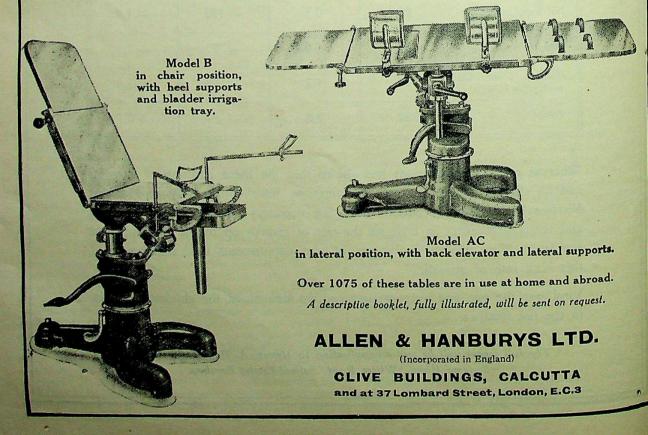
The St. Bartholomew's Hospital Operation Table is now manufactured in five different models and thus supplies a range of modern operation tables embodying the latest ideas of well-known surgeons for carrying out surgical operations.

All models can be supplied with either tripod or platform base.



Model A

In Trendelenburg position, 55° tilt, showing shoulder rests and instrument tray in position.



1940

cases of the former and 4,989 of the latter being The control of these diseases depends on wide provision of latrines and protection. reported wide provision of latrines and protected water the more wide incidence of diphtheria which is sporadic applies. supplies to show an increase from 135 in 1937 to

The incidence of malaria during the year showed 165 in 1938. The increase. In many localities it was below the normal no increase. In many localities to was below the normal for the previous five years. The island-wide organizafor the previous live years. The Island-wide organiza-tion established as the result of the 1934-35 epidemic has functioned well in keeping the disease under

The hookworm campaign carried out 2,169,931 control.

The leprosy campaign which has completed its survey and organized its control work in the Eastern, Western, and organized his control work in the Eastern, western, Sabaragamuwa and Southern Provinces completed the Sabaragamuwa and Southern Fromices completed the North-Western, North-Central and Central Provinces, and carried out follow-up work in provinces completed in previous years. At the end of the year there were 1,002 cases segregated at the two asylums, and 1,517 cases outside on parole.

The island-wide survey of filariasis completed the North-Western and Southern Provinces. The demonstration in filariasis control in Dewamedi Hatpattu in the North-Western Province was continued. Regula-tions for the control of the disease are before the Executive Committee of Health for their approval.

The control of yaws has been placed on a satisfactory basis and the work was well organized during the year by each medical officer of health and field medical officer surveying all cases in his area and recording and treating them. All contacts are also noted and both cases and contacts are looked up and treatment given to those needing it every six months.

Maternity and child welfare work continues to be popular. The work was carried out at 311 centres as compared with 207 in 1937; 9,485 clinics were held as compared with 8,375 in 1937, with a total attendance of 76,108 cycles to the continues to be popular. of 76,108 expectant mothers as compared with 39,841 in 1937, 157,988 infants as compared with 88,479 in 1937 and 75,177 pre-school children as compared with 39,637 in 1937. In spite of this increased work it is rather disconcerting to find an increase in the infant mortality rate from 158 in 1937 to 161 in 1938 and in the maternal mortality rate from 160 in 1627 to 2011; 1938

mortality rate from 19.9 in 1937 to 20.1 in 1938.

The number of schools in which health work been done increased from 3,106 in 1937 to 3,461 in 1938; the number of children medically inspected increased from 84,730 in 1937 to 94,648 in 1938; the defects found were 173,071 compared with 124,540 in 1937; and the defects treated were 73,340 or 42.4 per cent compared with 36 per cent in 1937. School health education has received greaten interest and convent. received greater interest and support.

REPORT OF THE EUROPEAN MENTAL HOS-PITAL AT RANCHI FOR THE YEAR 1938. BY MAJOR MOORE TAYLOR, M.D., D.P.H., I.M.S., MEDICAL SUPERINTENDENT

An endeavour has been made to keep in touch with and practise all modern methods of treatment. Those methods which handern methods in the past, and methods which have proved beneficial in the past, and which have beneficial in the past, and which have been fully described in previous reports, e.g., prolonged narcosis, pyrexial and malarial therapy, hydrotherapy, etc., are continued, and need no further description

discharged as cured—the ratio per cent of cures to discharged as cured—the ratio per cent of cures to increase of 11.03 per cent as compared with the rate in rate in 1936.

from schizophrenia were treated by shock therapy.

from schizophrenia were treated by shock therapy.

(I) Cardiazol therapy alone, (2) Cardiazol therapy with pyrexial therapy (3) Cardiazol therapy combined suffered from schizophrenia were discharged as

'improved', all of whom received treatment by the cardiazol method combined with pyretotherapy

Convulsion therapy was not successful in all cases in which it was administered. In 13 patients there was no improvement, in 10 patients there was improvement—but the mental condition after treatment did not warrant their appearance before the committee of visitors with a recommendation for discharge. In seven patients the treatment had to be discontinued as the mental symptoms appeared to be aggravated, but in no case was the treatment followed by any alarming physiological result.

My own experiences of convulsion therapy during the first six months of 1938 were published in the *Indian* Medical Gazette (October 1938). Statistics are now available from nearly all European and extra-European countries covering upwards of 4,000 cases. These show that full remissions can be achieved in 50 per cent of recent cases (duration of illness 12-18 months). The prospects of success diminish in ratio with the length of duration. The treatment has been given to all new admissions in this hospital, and all other cases in the hospital which were suitable for treatment were given a trial, no matter what the duration of the illness.

The cases classified as 'improved' were those in

which gross schizophrenic symptoms were manifested, but in much milder forms. Marked ameliorative changes occurred in the clinical status of this group both during and after treatment, and some, for the first time in years, became capable of doing productive

The cases classified as 'not improved' were those who showed no essential change in their hospital status, or those who presented evidence of intensification of symptoms.

The small number of cases makes it impossible to evaluate sex differences, but from the results obtained it would appear that treatment by the method is more beneficial in males than in females. The study of the subject is still being continued in this hospital, and it is hoped to publish later a detailed critical analysis of the work which is being carried out. The ultimate value of this form of treatment will of course be determined by the degree of permanency of improve-

It was found in some cases that the action of cardiazol is enhanced by small doses of insulin, and in such cases we administer from 20 to 50 units of insulin, subcutaneously, two hours before the cardiazol injection, and the convulsions appeared to occur with greater facility. There is no doubt that the introduction of shock therapy has brought about an increased interest and enthusiasm in psychiatry. results have amply justified this method of treatment. It is safe, and can be used in private practice and even at home.

Insulin method of shock therapy.—The literature on the insulin shock therapy of Sakel has been extensive. In this hospital the method has not been used extensively. Insulin cases require careful and constant supervision, and it takes a long time to learn the intricacies of the method. The treatment requires hospitalization and nursing of the highest type. Physicians must be in constant attendance. The literature indicates that in about 7 per cent of the cases of insulin shock, early termination of the coma may be necessary because of alarming signs and symptoms. Among these complications and dangers are vomiting, aspiration of saliva, vasomotor collapse, spasm of the glottis, tachycardia, cyanosis, prolonged extensor spasms, epileptiform convulsions, and after-shock or even status epilepticus, which may occur in spite of an adequate epilepticus, which may occur in spite of an adequate carbohydrate intake.

It is claimed that with insulin therapy the best sponse is obtained with hebephrenic and paranoid cases exhibiting an acute onset with marked symptoma-tology and hallucinations. With care, the complications likely to occur with the insulin method can be reduced to a minimum, and it is not suggested that there is any advantage of cardiazol therapy over insulin therapy, but when the staff is barely sufficient to meet the ordinary needs of the hospital, one is compelled to

give preference to cardiazol therapy—but I should have liked to have tried by the insulin method all cases where there was failure by cardiazol therapy.

The treatment of schizophrenia by the cardiazol method is, however, so much easier and less costly to administer than the insulin method, that it is urgently desirable to establish its value and limitations.

General paralysis of the insane.—Two patients in the cardiazon of this disease who had complete remissions.

early stage of this disease who had complete remissions were discharged, and were able to resume their normal activities. The method of treatment used in both cases was a combination of tryparsamide and malarial therapy. Three patients in an advanced stage of general

paralysis showed no improvement with this treatment.

Occupational therapy continues to be the chief adjunct to other methods of treatment. It is a means of treating patients in the early stages of disease and in convalescence, and even those whose condition is considered irrecoverable. In many cases recovery is hastened and in others institutional life is made more pleasant. The department continues to make all uniforms of ward-boys, ayahs, and menial staff, most of the patients' clothing, and all ward furniture. The interest which the patients obtain from a mere change interest which the patients obtain from a mere change interest which the patients obtain from a mere change interest for the time being from seeing others. of environment for the time being, from seeing others doing good and interesting work, and more especially from the personal experience that they can do something useful, is of great value. They acquire a new outlook, and gain self-confidence, and these, in many cases, are the beginnings of a larger usefulness to the general community. In the occupational department patients are allowed to select their own work as far as possible. This is important, because what appeals and acts as a stimulus to one may not affect another. They may be engaged in the making of rugs, raffia and cane baskets, trays, weaving, needlework, designing, painting, bookbinding, and in metal, leather and woodwork. The classes in cookery are popular with both sexes.

We have not yet developed a reasonable expectation of recovery in any type of mental disease, but even if that day does arrive, there will still be a large residue of patients for whom specialized care must be provided during the remainder of their days. To these the institution is home. They form a real community and their fundamental needs—food, shelter, work, play, friendship—can only be met in an institution of this description. The climate here is such that all patients, except the few confined to bed, or on special treatment, are out of doors and about the grounds, engaging in activities ranging from strolling to highly-organized and

competitive games.

The patients assisted by the staff staged a number of excellent concerts during the year, and parties attended the cinema at Ranchi, whenever suitable films were being shown. The social evenings and dances were being shown. The social evenings and dances continue, and a full Christmas programme was brought to a close with the usual New Year's Eve Fancy

The daily classes under a qualified instructor are greatly appreciated by both male and female patients.

#### THE REPORT ON THE WORKING OF HOS-PITALS AND DISPENSARIES IN THE PUNJAB FOR THE TRIENNIUM 1935-37

In spite of the financial stringency and economic depression the activities of the medical department during the triennium 1935-37 were not restricted. The triennium opened with 961 dispensaries (687 in rural and 274 in urban areas) and closed with 968 (693 in rural and 275 in urban areas). The total number of State Public Hospitals in the Province at the close of the year 1937 was 53 as compared with 51 in 1936 and 50 in 1935.

There were 364 rural dispensaries including nine subsidized dispensaries functioning in the province on the 31st December, 1937, viz, 360 out of 375 provided under the 1925 scheme for expansion of medical relief in rural areas, and four maintained by district boards. The difference in the annual cost of maintenance of two classes of dispensaries is considerable;

Government have decided that in future the expansion of medical relief in rural areas should be by means of opening subsidized dispensaries. As at present organ, opening subsidized dispensaries. As at present organized, a rural dispensary serves only a few villages in the immediate vicinity. To increase the usefulness of these dispensaries and to bring modern medical relief within easy reach of villages, it is essential under present conditions, when very few private practitioners have settled in the rural areas, that doctors in charge of rural dispensaries should periodically visit large villages within their areas. A beginning has been made in this direction and a scheme under which medical officers of rural dispensaries are required to tour in the surrounding villages has been successfully tried in selected tahsils of 23 districts.

As compared with the last year of the previous triennium 1932–34, the total number of patients treated fell by 165,571 in 1935, but increased by 619,920 in 1936 and by 715,668 in 1937. The decrease in 1935, which was in the number of out-patients only, was due to a lower incidence of malaria in that year. There was, however, a steady increase in the number of in-patients. viz, 6,050 in 1935, 6,956 in 1936 and 16,300 in 1937 as compared with the figures for the year 1934. The principal diseases during the triennium under review were malaria, dysentery, cataract, pneumonia, influenza, enteric fever and tuberculosis. The total number of surgical operations performed rose from 569,671 in 1934 to 592,442 in 1935, 606,720 in 1936 and 630,969 in 1937. This steady increase in surgical work is a sure indica-tion of the growing popularity of hospitals and dispensaries. Government have read with pleasure the names of the medical officers mentioned in paragraph 25 of the report who performed the largest number of surgical operations, mainly cataract extractions.

In addition to the five leper homes, managed by the mission organizations and subsidized by Government and the Punjab Branch of the British Empire Leprosy Relief Association, there are 100 leprosy out-door clinics in the province. Accommodation in these homes is, however because in independent of the province. however, becoming inadequate, partly as the result of non-infectious cases remaining at the homes and partly owing to the large number of lepers coming from

places outside the Punjab.

The scheme inaugurated in 1925 for providing medical aid to women by lady assistant surgeons in separate hospitals at each district headquarters and by women sub-assistant surgeons at each tahsil headquarters has not so far been completed. During the triennium under review seven new women's hospitals or sections were opened involving an addition of one woman assistant surgeon and six women sub-assistant surgeons to the existing cadre, which now consists of 10 women assistant surgeons and 55 women sub-assistant surgeons. There is, however, still one district headquarters, namely, Jhelum and 52 tahsil headquarters in the province which are without a later during the province

which are without a lady doctor.

Medical education among girl students is becoming increasingly popular, so much so that many are refused admission in medical colleges and schools for want of accommodation. During the triangular many are review accommodation. During the triennium under review accommodation. During the triennium under review qualified themselves for the diploma and certificates of the Punjab Central Midwives Board.

The schemes for the medical inspection of school children both in rural and unbeau and the anti-

children both in rural and urban areas, and the anti-rabic work at the provincial centre at Lahore and also at district and tahsil headquarter hospitals continue

to function satisfactorily.

## ANNUAL REPORT ON THE WORKING OF THE PUNJAB MENTAL HOSPITAL, LAHORE, FOR THE VEAR 1020 THE YEAR 1938

THE total number of patients treated in the hospital rose from 1,153 (923 males and 230 females) in The to 1,235 (988 males and 247 females) in 1938. number of patients admitted during the year was and 23 females) in the present the year was and 23 females) in the present the

The number of patients discharged from the prospital was 166, viz, 84 'cured', 30 'improved', 34 'put

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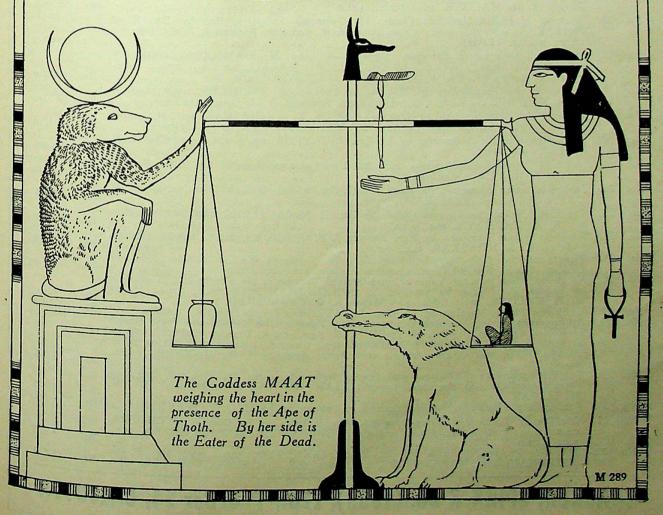
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improved' and 18 'otherwise' as compared with 143, viz, 58, 25, 52 and 8, respectively, in 1937.

The total number of deaths was 32 in 1938 and 29 in 1938 of were due to 1938.

The total number of deaths was 52 in 1938 and 29 in 1937. Of 32 deaths in 1938, 6 were due to pneumonia, tuberculosis of the lungs, 2 each to ankylos-debility dysentery, diarrhea and coil. 5 to tubeletanos of the large, 2 each to ankylostoma, debility, dysentery, diarrhœa and epilepsy and the remaining 11 to various other causes.

Of the total number treated in the hospital during the year 216 (211 males and 5 females) were criminal the year 210 (211 males and 5 females) were criminal patients. The year 1938 opened with 150 criminal patients, 62 were admitted and 4 re-admitted during the year, 43 were discharged or transferred and 6 died.

The existing accommodation in the hospital both for and female patients is not adequate. New male and female patients is not adequate. New barracks for 300 additional male patients are now ready and will be occupied as soon as the additional staff for which the sanction of Government has been applied for is provided. The project of a double storeyed block for 100 additional female patients has been sanctioned.

In 1938 special forms of treatment by cardiazol and insulin were introduced and very promising results were obtained. Out of 94 patients treated 27 were cured and 31 improved. Owing to the shortage of funds it was not possible to try the experiment on a large

ANNUAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE MADRAS PRESIDENCY FOR THE YEAR

The number of medical institutions of all classes in the Province increased from 1,283 in 1937 to 1,322 in in 1938. This was mainly due to the increase in the number of private-aided institutions from 79 to 115 and of subsidized rural dispensaries from 404 to 416. The total number of in- and out-patients increased from 280,150 to 310,030 and from 17,179,284 to 18,692,411 respectively. The percentage of deaths to the total number treated decreased from 4.79 to 4.62.

Tuberculosis.—The Tuberculosis Institute at Egmore, the Tuberculosis Hospital at Royapetta, the Tuber-culosis Clinic in the Victoria Caste and Gosha Hospital, Madras, and Tuberculosis Sanatorium at Tambaram did good work during the year under review. The number of patients treated for tuberculosis increased from 76,915 to 85,799. The tuberculosis clinic run by the king Coangle, and Tuberculosis Clinic run by the coangle, and the coangl King George Thanksgiving Fund continued to be in charge of contact examination. In December 1938 a ward of ten beds for women was constructed at the Tambaram Sanatorium out of His Excellency the Viceroy's Entertainment Fund and was handed over to the Government. The Government have permitted private patients to construct contracts of the senatorium

private patients to construct cottages at the sanatorium. Leprosy.—Anti-leprosy work continued to make steady progress. The number of leprosy clinics increased from 442 to 456 and the total number of cases treated increased from 62,228 to 62,751. Leprosy officers carried out survey work in 82 villages. Students numbering 24,139 in 157 schools were examined and 389 cases of leprosy were detected. cases of leprosy were detected.

X-ray department.—There was a large increase radiological work (159,543 sittings as against 119,543 in the previous year) in the Barnard Institute of the previous year) in the Barnard Institute of Radiology, Government General Hospital, Madras. Six medical officers were trained at the Institute.

Medical services.—In accordance with the scheme for

the appointment of honorary medical officers in Government medical institutions, seven posts of civil assistant surgeon were thrown open to honorary officers and steps are being taken to accelerate the appointment of honoraries to more paid posts.

### Correspondence

#### COOLEY'S ERYTHROBLASTIC ANÆMIA To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,-I was interested to read a case report of Cooley's anæmia by Napier and others in your issue of the current month [the paper appeared in the November number]. I had come across two cases of this condition at the B. J. Hospital for Children, Bombay, under the care of Dr. G. Coelho.

Two such cases were demonstrated by Dr. G. Coelho the J. J. Hospital Post-Graduate Clinical Union meeting held on 17th March, 1939, and published in

the Medical Bulletin of 6th May, 1939.

Detailed accounts of these same cases were reported by me at a meeting of the Teaching Pathologist held on 17th June, 1939, at Bombay. Accounts of this meeting had appeared in the Medical Bulletin of 2nd September, 1939.

J. G. PAREKH, M.R.C.P., Honorary Assistant Physician.

J. J. HOSPITAL. Вомвач, 15th December, 1939.

[Note.-We are afraid that we overlooked the account of these two cases of Cooley's anæmia that appeared in the May issue of Medical Bulletin: the second report had not come into our hands when we sent our

account of this case to press.

There seems to be little doubt that Dr. Coelho's cases were also Cooley's anæmia, though the bony changes in the skull were not nearly so characteristic as in our case.

Another case, also from Bombay, was reported in the October number (received late in November) of the Indian Journal of Pediatrics; again the bony changes

e not so marked but are certainly suggestive. The fact that four cases have been diagnosed in so short a time, in two centres in India thirteen hundred miles apart, suggests that the disease is not uncommon in this country, and adds support to the editorial remark in our last issue, namely, that few diseases are peculiar to one locality or to one racial group.— L. E. NAPIER.]

#### Service Notes

APPOINTMENTS AND TRANSFERS MAJOR-GENERAL G. G. JOLLY, C.I.E., V.H.S., Officiating Director-General, Indian Medical Service, is confirmed in his appointment, with effect from the 8th November, 1939.

Colonel (now Major-General) G. G. Jolly, C.I.E., 17th August, 1939, vice Lieutenant-Colonel (Brevet-Colonel J. Taylor, C.I.E., D.S.O., V.H.S., is appointed Honorary Physician to The King, Colonel J. Taylor, C.I.E., D.S.O., V.H.S., is appointed Colonel J. Taylor, C.I.E., D.S.O., V.H.S., is appointed Colonel Sir Alexander J. H. Russell, Kt., C.B.E., retired. C. I. M. H., Dehra Dun. Dated 14th November, 1939. C. I. M. H., Dehra Dun. Dated 14th November, 1939.

Lieutenant-Colonel A. D. Loganadan is appointed as a leave reserve officer in the Central Indian Medical Service Cadre and is posted to the Office of the Director-General, Indian Medical Service, with effect from 8th December, 1939 (afternoon).

His services are placed at the disposal of the Government of Bombay, with effect from the 12th December,

Lieutenant-Colonel Jelal M. Shah, M.B.E., has been appointed as Superintendent of Mahableshwar, with effect from the forenoon of 14th December 1939.

On reversion from foreign service under the I. R. F. A., Captain T. Sommerville has been appointed a leave reserve officer in I. M. S. Cadre under the

Central Government, with effect from the afternoon of the 28th September, 1939.

Captain G. W. Miller is appointed as a leave reserve officer in the I. M. S. (Civil) Cadre under the Central Government, with effect from the 4th October, 1939 (forenoon), and until further orders is posted to the Port Health Department, Bombay.

Captain J. White made over charge of the Midnapore Central Jail to Major B. Chowdhury, on the forenoon of the 4th November, 1939.

Captain P. I. Franks is appointed to be Surgeon on the personal staff of His Excellency the Governor of Bengal, with effect from the 18th November, 1939.

Captain T. E. Palmer, o.B.E., was transferred to Civil employment in Madras. Dated 19th November, 1939.

Captain W. A. N. Marrow was transferred to Civil employment in Madras. Dated 24th November, 1939.

Captain D. W. Taylor, officer on special duty at the Mayo Hospital, Lahore, assumed charge of the office of Civil Surgeon, Ambala, on the 1st December, 1939, forenoon.

Captain R. L. Raymond, Civil Surgeon, Magwe, was posted for duty to the Defence Department as Special Officer to conduct a survey of 'goitre' in the Chin Hills. He relinquished charge of his duties as Civil Surgeon, Magwe, on the forenoon of 22nd December, 1939.

#### LEAVE

Lieutenant-Colonel R. C. Wats, Assistant Director, Haffkine Institute, Bombay, has been granted leave for 1 month, with effect from the forenoon of 3rd January, 1940, with permission to prefix the Christmas and New Year's day holidays to the leave.

Lieutenant-Colonel C. J. Lodge-Patch, M.C., Superintendent, Punjab Mental Hospital, Lahore, who was on leave ex-India till the 12th October, 1939, has been granted by the High Commissioner for India an extension of leave for six months.

Lieutenant-Colonel S. Nag was granted leave ex-India for the period from the 24th November, 1937, to the 9th April, 1939.

Previous notification is hereby cancelled.

Lieutenant-Colonel K. S. Thakur, Civil Surgeon, 24-Parganas, was granted leave for the period from the 26th April, 1938, to the 25th May, 1939.

Previous notification is hereby cancelled.

#### PROMOTIONS

Colonel G. G. Jolly, C.I.E., K.H.P., promoted to the rank of Major-General, with effect from the 8th November, 1939.

Lieutenant-Colonel to be Colonel

H. S. G. Haji, M.c. Dated 22nd October, 1939, with seniority from 25th July, 1935.

Majors to be Lieutenant-Colonels

P. A. C. Davenport. Dated 22nd October, 1939.

D. P. Bhargava, O.B.E. Dated 5th December, 1939.

Brevet Lieutenant-Colonel A. H. Craig. Dated 23rd

December, 1939.

Captain to be Major
W. J. Moody. Dated 6th December, 1939.

Lieutenants (on probation) to be Captains (on probation)

W. M. McCutcheon. Dated 27th September, 1939, with seniority from 1st May, 1939.

W. D. P. Griggs. Dated 19th October, 1939, with seniority from 1st May, 1939.

D. S. Wilson. Dated 1st November, 1939.

#### RETIREMENTS

Colonel W. A. M. Jack, O.B.E. Dated 11th November, 1939.

Colonel S. G. S. Haughton, C.I.E., O.B.E., R.H.S.

Lieutenant-Colonel H. Williamson, o.B.E. Dated 23rd August, 1939.

Lieutenant-Colonel L. F. Brandenbourg. Dated 11th December, 1939.

#### Note

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# Original Articles

AORTIC STENOSIS\* By GERARD KELLY, F.R.C.P.(1.) MAJOR, I.M.S.

Clinical Medicine, Medical College Hospitals, Calcutta Professor of

THE fact that mitral stenosis, the unquestionable stigma of previous rheumatic infection, is a commonplace in many parts of India bespeaks the widespread presence amongst us of the seed, or hypothetical agent, that induces the rheumatic infection. In certain respects, India is the soil par excellence for the infectious agent: I refer to the sociologic factor, namely, the poverty of the masses in India and to the fact that India is the classical domain of deficiency diseases. The climatic factor too may be comprehensively assessed in the wide terrain of the Indian subcontinent with its unique range of climates. Finally, some parts of India have a seasonal abundance of streptococcal infections, such as tonsillitis, sore throats, acute sinusitis, and middle-ear disease which are often the precursors as well as important complications of our predominantly subacute rheumatism, which is not less serious than the rheumatic fever of England is dangerous. Accordingly, the rendition of satisfactory figures for our incidence of rheumatic heart disease would be much appreciated by those physicians abroad that are concerned with the rheumatic problem. If, however, we are to submit unimpeachable figures for our incidence of rheumatic heart disease and of other atiological types of organic heart disease, we must adopt standard methods of classification and investigation and our clinical, electrocardiographic, radiological and pathological reports must be correspondingly accurate. I feel sure that if acceptable figures for the incidence of rheumatic heart disease were available to Homer J. Swift, he would hardly have stated at the First International Health Broadcast from New York in 1938 that 'Rheumatic heart disease rarely occurs among inhabitants of the tropics, unless they have contracted it elsewhere'. This paper on aortic stenosis and a previous one Some Notes on Clinical Heart Disease' (Kelly, 1930) 1939) are an attempt to indicate briefly some modern concepts of heart disease and methods of inquiry into it.

There are two main clinical groups of cases of aortic stenosis, the young and the elderly group. The fundamental pathology of both groups is essentially rheumatic. In young people aortic stenosis is the hall-mark of a severe rheumatic carditic is to carditis in the past. In elderly men, that is to say in men over fifty years of age, aortic stenosis, according to Dry and Willius (1939) of the Mana China to Dry and Frogressive of the Mayo Clinic, is the outcome of progressive

calcification of aortic valves that have been slightly damaged by the rheumatic infection in early life. 'The time factor', remarked Dry and Willius, 'explains why calcification need not be a universal concomitant of healed rheumatic lesions, because those harbouring the more serious forms of the disease, especially when accompanied by mitral stenosis, are weeded out by death before such an event as calcification can occur, thus leaving the solitary aortic lesion, one that the heart tolerates far better than mitral stenosis, to continue for a long time without embarrassing the cardiac reserve'. 'The evidence derived from the study of this material (288 cases of calcareous disease of the aortic valve) has led us', stated Dry and Willius, 'to accept unequivocally rheumatic infection as the ætiological factor in calcareous disease of the aortic valve. Rheumatic infection which eventually culminates in calcareous stenosis of the aortic valve was originally a mild form of rheumatic carditis which has allowed both the mitral valve and the myocardium to escape with minimal or no damage'. 'Our material', they observed, 'was derived largely from the Middle Western States where, on the whole (as perhaps in India), mild and atypical forms of the disease may be anticipated. The frequent absence of a rheumatic history in calcareous disease of the aortic valve clearly substantiates, in the opinion of Willius, his hypothesis that 'the original acute inflammatory episode was mild and perhaps so atypical that its significance could not be realized at the time'. He concludes that calcareous disease of the aortic valve 'is not rare' in the Middle West of America. 'It is possible', he remarks, 'that surveys in the regions where the disease (rheumatic infection) is more prevalent may show a relatively lower incidence of calcareous disease of the aortic valve'. The prevalence of rheumatic heart disease in Bengal may be approximately gauged from our hospital statistics given later in this paper. Until the distinctive features of calcific aortic stenosis are more widely known to the general practitioner its incidence cannot be fairly estimated.

#### Rheumatic heart disease in hospital practice

In the ten-year period, 1930 to 1939, there were 32,907 admissions (28,107 Indians and 4,800 Anglo-Indians) from all causes, to the medical wards of the Medical College Hospitals, Calcutta. Of these, 351 (310 Indians and 41 Anglo-Indians) were cases of rheumatic heart disease, as detailed below. Otherwise stated, one medical admission in every hundred was a rheumatic heart case. The prevalence however of cardiac rheumatism in Bengal is, in my opinion, somewhat less than our hospital figures suggest. Furthermore, the rheumatic infection in Bengal is more subacute than florid. 'Climate appears to be an important factor in the incidence both of the rheumatic infection and of the rheumatic type of heart disease. For example, in Boston at the Peter Bent Brigham Hospital

<sup>\*</sup>Being an elaboration of a paper read at the Calcutta Medical College Reunion, 1939.

the incidence of rheumatic fever in the years 1914 to 1923 was 1.85 per cent of all medical admissions, the clinical incidence of mitral stenosis was 3.89 per cent, and the incidence of mitral stenosis in the autopsy room was 4.68 per cent, while in New Orleans at the charity hospitals these percentages from 1916 to 1923 were 0.3, 0.08, and 0.23, respectively, and at Baltimore at the Johns Hopkins Hospital from 1914 to 1922, 0.73, 2.01, and 1.30, respectively' (White, 1937).

Clinical diagnoses in the 351 cases of rheumatic heart disease treated at the Medical College Hospitals, Calcutta .

Mitral stenosis	 120
Mitral incompetence	 15
Double mitral	70
Mitral and aortic valve disease	 25
Double aortic	 4
Rheumatic carditis	 107
Rheumatic aortic incompetence	 4
Rheumatic pericarditis	 6
	-
	351
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I have deliberately omitted a statement of the sex incidence, as in view of the purdah system the figures would necessarily be misleading. The criteria given in the Nomenclature and Criteria for Diagnosis of Diseases of the Heart, 1939, should be more generally employed in India for the classification and diagnosis of heart disease. Diagnostic inexactitudes, such as 'double mitral' and 'double aortic', should be abandoned: surely one of the lesions is predominant.

#### Incidence of aortic stenosis—clinical group

Calcareous disease of the aortic valve was diagnosed clinically in two of 1,832 cases of cardiovascular disease admitted to the Medical College Hospitals, Calcutta, from 1930 to 1939. McGinn and White (1934) of the Massachusetts General Hospital reported 113 cases of aortic stenosis (2.3 per cent) in 4,800 cardiac patients. Campbell (1937) observed that out of every six rheumatic cases three had aortic incompetence and mitral stenosis, the fourth had aortic stenosis as well, and the fifth and sixth were clinically without mitral disease, one having aortic incompetence alone and the other aortic stenosis and incompetence. A case of aortic stenosis and incompetence with mitral stenosis is described later in this paper.

Incidence of aortic stenosis-post-mortem series

McGinn and White (1934) reported 123 cases of aortic stenosis (1.8 per cent) in 6,800 autopsies of all types of disease. Of these 123 cases, 86 had calcareous changes in the aortic valve and 37 had aortic stenosis without calcareous changes: the majority of the former group were over 50 years of age, whereas the vast majority of the latter were under 50. The subjects of calcareous disease of the aortic valve are notoriously prone to sudden death. Hence calcific aortic heart disease is not infrequently encountered as a medico-legal cardiac case. Our

post-mortem material consists of a total of 1,995 cases of all types of disease autopsied in the period 1915 to 1937. I am grateful to Dr. M. N De, lately Professor of Pathology, for the conneeted records, which suggest that aortic stenosis is practically non-existent in Bengal. Incident. ally, if we are to develop a precise and scientific knowledge of heart disease in this country we must wherever possible supplement our clinical cardiology by pathological studies of our cardiovascular diseases and anomalies. Useful guidance may be bad from the section entitled 'An Outline for the Pathological Diagnosis of Cardio. vascular Diseases and Anomalies', in the New York Heart Association's standard work mentioned above. Seven international authorities on cardiovascular pathology are responsible for this section.

#### Rheumatic aortic stenosis

'As a rule, aortic stenosis is merely one element in rheumatic heart disease. It may be accompanied by aortic regurgitation, mitral defect, and myocardial and pericardial disease. In the pathogenesis of heart failure in such cases, aortic stenosis most often plays only a subordinate rôle. Actually, as a previously leaky valve narrows, the added work thrown on the left ventricle by the stenosis may no more than substitute for that spared the chamber by the diminution in regurgitation due to the constriction of the aortic aperture' (Fishberg, 1937). Aortic valvulitis, according to Horder, in the endocarditis is particularly common occurring during scarlet fever, a specific fever which I have never encountered in the tropics. Possibly school medical officers in certain parts of India may have some experience of it. Gallavardin's own rheumatic type of aortic stenosis in young subjects is probably congenital in origin rather than a subacute endocarditis of unknown ætiology. Miller advises us that aortic stenosis due to rheumatism is practically unknown in children. Signs of aortic stenosis in 3 child should arouse a suspicion of a congenital heart lesion or of malignant endocarditis.

#### Calcific aortic stenosis

Priority of description of calcific aortic stenosis belongs to Bonetus, who in his Sepulchretum, 1679, the early forerunner of Cabot's Differential Diagnosis, 1911, presented the case of the robust middle-aged Parisian tailor who dropped dead in the street and showed calcified stenosed aortic valves on autopsy. In 1931, American cardiol-Christian, the doyen of ogists and the guru of Levine and others wrote a significant paper on aortic stenosis with calcification. In this landmark in the study of aortic stenosis Christian not only concluded that calcific aortic stenosis calcific aortic stenosis was of rheumatic original but he also adumbrated the finding of calcifer tion of aortic valves radiologically. In 1933, Sosman and Wosika described a fluoroscopic procedure whoselves a life of the control of the co procedure whereby calcific aortic leaflets can d of 1,995 ed in the Dr. M. N the conc stenosis Incidentscientific untry we

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visualized during life. Our interest in calcific visualized was immediately and enthusiastically revived.

Evidence of the rheumatic origin of calcific aortic stenosis

From a critical analysis of 200 cases of calcific aortic stenosis studied at necropsy, Clawson et al. (1938) decided that this lesion was invariably due to rheumatic infection. The following observations furnished the basis of their conclusion. The incidence of a rheumatic history and of stigmata of previous rheumatic infection in calcific aortic stenosis approximated that of other healed rheumatic deformities of the valve. The stigmata of previous rheumatic infection included deformities of the mitral or other valves, adherent pericardium, the presence of Aschoff nodes in the myocardium, a definite inflammatory reaction in 68 per cent calcified aortic cusps and aortic-valve vascularization in 95 per cent of cases. We know that blood vessels do not exist in human heart valves and that valve vascularization is secondary to rheumatic valvulitis (Gross and Friedberg, 1936, and Gross, 1937). 'That deposition of calcium', remarks Willius, 'should occur in a region of low vascularity, from which inflammatory products cannot be absorbed adequately, is one expression of the phenomenon of calcification in general'. 'The leaflets of the heart valves', continues Willius, 'satisfy this set of circumstances perfectly'. Cholesterol crystals, so commonly seen in atherosclerosis, were not seen by Clawson in any of the calcified aortic valves. The gross structure of the aortic valves in calcified valve deformity was, in Clawson's opinion, in all respects similar to the structure of the calcified mitral valves sometimes observed, and not at all characteristic of an atherosclerotic process. Atherosclerotic thickening of the aortic cusps is further negatived, according to Clawson, by the remarkable smoothness of the aorta in the subjects of calcific stenosis. He suggests that the stenosed aortic valves, diseased from early life, buffer the systolic impact of the aorta and thus protect the ascending aorta. Willius' paper is on somewhat similar lines to that of Clawson's in the matter of evidence. They both stress the frequency of a rheumatic history and of stigmata of rheumatic infection, which they think is too great to be regarded merely as a casual and not a causative factor. Willius believes 'that rheumatic infection which culminates in calcareous disease of the aortic valve differs only in a quantitative manner and not in any qualitative manner, from other types of rheumatic carditis'.

Other advocates of the rheumatic ætiology of calcife calcific aortic stenosis are Christian (1931), McGinn and White (1934), Contratto and Levine (1937), and Boas (1935).

Other views

Friedberg and Sohval (1939) do not preclude a non-rheumatic form of the disease. Margolis,

Zeillesson and Barnes (1931) and others hold that in some cases the lesion is the result of a non-inflammatory degenerative process. Cabot's idea (1926) that calcareous disease of the aortic valve represents the healed stage of subacute bacterial endocarditis is, according to Willius, another intriguing but unsupported supposition. Libman suggests that congenitally bicuspid aortic valve may furnish the basis of some cases. Finally, it is to be remembered that syphilis is never a cause of aortic stenosis. About 30 cases of combined syphilitic aortitis and rheumatic disease of the heart have been reported up to

#### Symptomatology

'The only symptoms of aortic valve disease are the tendency to faintness, dizziness, or even syncope in patients with marked aortic stenosis' (White, 1937). We shall here confine ourselves to calcific aortic stenosis: the symptoms encountered in a case of aortic stenosis in young subjects are recounted later in this paper.

Calcific aortic stenosis is remarkably well borne by the left ventricle for many years. It is amenable to faultless compensation by the substitution of hypertrophy for dilatation at each stage, not only because of the inherent gradualness of the narrowing process but also because aortic and coronary sclerosis are likely to occur in inverse proportion to the degree of stenosis of the aortic valve. Eventually, the left ventricle yields behind the obstructed aortic orifice. The resultant effort-dyspnæa is often the earliest and may be the sole symptom for years. Cough due to chronic pulmonary congestion is commonly complained of and 'bronchitis' is often misdiagnosed, because of the patient's age and the absence of systemic ædema. Hæmoptysis occasionally occurs. Later, paroxysmal dyspnœa may gravely distress the patient at night. The progress of heart failure in aortic stenosis is relentless. Finally, rightsided heart failure appears and death from cardiac failure, which is the commonest mode of termination of aortic stenosis, follows in about six months. The specific symptomatology of calcific stenosis, dizziness, syncope and angina pectoris, commonly occurs in the midst of these distressing symptoms of heart failure, and so may be displaced to the background of the clinical picture and pass unrecognized unless direct inquiry is made. The para-dyspnæic angor of Gallavardin, or the sense of intense oppression in the chest sometimes amounting to actual pain associated with severe paroxysmal dyspnœa, must be clearly distinguished from true angina pectoris. 'Angina of decubitus' usually does not occur in aortic stenosis of calcific type. The not infrequent confusion of cardiac asthma with angina pectoris is ably discussed by Bedford (1939) in his excellent account of left ventricular failure in the Strickland Goodall Memorial Lecture.

#### Angina pectoris

About half the cases of calcific aortic stenosis exhibit angina pectoris. The mechanism of its production is myocardial ischæmia due to coronary insufficiency. For purposes of simplicity and clarity, I shall endeavour to summarize briefly the various explanations for this coronary insufficiency, ably advanced by Harrison (1939), Green (1936), Fishberg (1937), Contratto and Levine (1937) and Friedberg and Sohval (1939).

When the aortic orifice is stenosed, thus obstructing the emptying of the left ventricle, the intraventricular pressure rises and the ejection velocity of the blood is greatly enhanced in order to maintain a given volume flow per unit of time. Now, the elevated intraventricular systolic pressure compresses the peripheral coronary vessels after the fashion of the blanching of a tightly-clenched fist and perhaps the accelerated blood flow past the coronary orifices produces suction of blood from the coronary vessels. Thus, coronary inadequacy may be present even at rest. Usually, however, this is more notable on exertion because the left ventricle, operating against the already extremely high intraventricular pressure, finds it difficult if not impossible further to augment the force of its contraction and the aortic pressure requisite for exertion. Increased heart size greatly intensifies such relative coronary insufficiency. The concentric hypertrophied heart of aortic stenosis is more appropriately described as 'heavy heart' than in terms of heart size. Verification of the theory of coronary insufficiency in these cases is frequently afforded by the coronary-thromboticlike pattern of the T-wave and RST segments, which is in keeping with the clinical picture. The frequent presence of angina pectoris in 'pure' aortic stenosis, that is, without clinically evident aortic regurgitation, promptly dismisses aortic insufficiency as a causal factor of anginal pain in these cases. The occurrence of coronary vaso-constriction in calcific stenosis, with resultant coronary insufficiency, is purely hypotheti-In hypertensive arteriosclerotic heart disease subjects, the situation of coronary pain is not uncommonly atypical.

# Dizziness, fainting and syncope in calcific aortic stenosis

These symptoms tend to occur in those aortic stenotics that suffer from angina pectoris as well. And like angina pectoris, attacks of faintness or downright syncope are complained of, mostly on exertion. Harrison attributes the syncopal attacks of calcific aortic stenosis to sudden diminution of the cardiac output, because of the aggravation by exercise of a pre-existing myocardial oxygen deficiency, with resultant cerebral anoxia. It may be extremely difficult to differentiate calcific aortic stenosis from coronary artery disease (arteriosclerotic heart disease). Both conditions are due to a common factor, namely, coronary ischæmia, with the

result that certain clinical and electrocardiographic features are common to both. Thus, they may both cause angina pectoris, cardiac failure and sudden death, and both may show conduction disturbances and T-wave changes electrocardiographically. In coronary arteriosclerotic subjects, however, syncope on effort fails to occur because, according to Harrison (1939), their myocardial anoxia is focal, whereas such syncope is a classical symptom of calcific aortic stenosis wherein myocardial anoxemia is diffuse. A history of dizziness and syncope in an elderly man should therefore suggest the possibility of aortic stenosis rather than arteriosclerotic heart disease. The finding of an aortic systolic murmur and thrill would render the differentiation from coronary artery disease clear. In all doubtful cases the aortic valves should be carefully scrutinized fluoroscopically for evidence of calcification. Levine (1936) and others attribute the tendency of calcific aortics to faintness and syncope to hypersensitivity of the carotid sinus reflexes.

#### DIAGNOSTIC CRITERIA

In 1934, McGinn and White advocated a considerable broadening of the previously rigid diagnostic criteria of aortic stenosis, which they concluded we were more often missing when it was present, than diagnosing when it was absent. In the opinion of Willius, the diagnostic criteria had not been recognized by the clinician until relatively recent years. Willius has closely studied aortic stenosis for many years and in such of his cases as failed to satisfy the old-time requirements necessary for a clinical diagnosis of aortic stenosis he sought radiological demonstration of calcification of the aortic leaflets. Truly 'the eye often misses what is not in the observer's mind but sees what it looks for '— Horder.

#### Before 1934

In his Medical Notes, Horder (1921) writes regarding a systolic murmur heard at the aortic base—'the first thing to say (to oneself) about a systolic bruit heard at the aortic base is that the case is probably not one of aortic stenosis. More likely causes of the bruit are . . But if, in addition to the presence of a systolic aortic bruit, the following features are also made out during the examination—

- (1) good conduction of the bruit towards the
- right side of the neck;
  (2) considerable hypertrophy of the left
- ventricle;
  (3) systolic thrill in the second right interspace; and
- (4) a small pulse—
  it may be said with confidence that the patient suffers from aortic stenosis. If to these findings
- were added—
  (5) diminution or absence of the aortic second sound; and

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(6) an aortic diastolic murmur the most fastidious physician of previous decades would probably have registered his complete would propagify the complete approval of Horder's excellent criteria. Inciapproval it may be noted that five signs, namely, aortic systolic murmur, aortic diastolic murmur, diminished or absent aortic second sound, aortic systolic thrill, and calcification of the aortic valve on fluoroscopic examination in calcific stenosis, emanate directly from the deformed aortic cusps.

#### Since 1934

A fair sample of British and American requirements for the clinical diagnosis of aortic stenosis is given respectively by Campbell (1937) and

by White (1937).

Concerning the diagnosis of aortic stenosis, Campbell states 'It is not so simple as that of aortic incompetence, although in cases of highgrade aortic stenosis it may at once be suggested by the feel of the pulse, both the slow rise and the sustained plateau being readily appreciated by the finger. A systolic murmur is often present as well as diastolic and may indicate nothing more than some roughening of the valves. Whenever there is a systolic murmur, a special search should be made for a systolic thrill and the rougher the murmur the more confidently may it be expected '.

'The combination of aortic stenosis and incompetence', he continues, 'is much commoner than pure aortic stenosis. It is sometimes said that only the expert should diagnose aortic stenosis in the absence of aortic incompetence, but the intention of this warning can be expressed better by the following statements. In the absence of aortic incompetence, stenosis should never be diagnosed unless there is a systolic thrill as well as a murmur, or the characteristic pulse of aortic stenosis or both.

In the presence of aortic incompetence, stenosis may be suspected even without a thrill if there is a very rough systolic murmur, especially if the pulse is less characteristic of aortic incompetence than would be expected from the loud diastolic murmur. The blood pressure should always be taken as a measure of the degree of stenosis and the pulse in both arms should be taken as a routine to detect the slighter cases of coarctation of the aorta'.

White's statement of the American attitude is as follows The triad of murmur, thrill and small pulse', he says, 'is the essential finding: the other findings are corroborative. It is not necessary to wait for an aortic systolic thrill or a plateau pulse to make a diagnosis of aortic stenosis: the diagnosis can be made on the systolic murmur alone in a patient without aortic dilatation or hypertension provided the murmur is loud and harsh. Accuracy of diagnosis has increased greatly in our hands since we have made this change in the diagnostic criteria of aordic stenosis.

The essential criteria defined by Willius as diagnostic of calcareous stenosis of the aortic valve are as follows:—

- (1) A loud rough systolic murmur over the base of the heart conducted into the vessels of the neck and in many instances over the præcordium.
- (2) The second heart tone is absent or diminished in intensity.
- (3) It is replaced by a soft blowing diastolic murmur where there is associated aortic regurgitation.
- (4) A thrill is usually palpable over the upper part of the sternal region.
- (5) Evidence of cardiac hypertrophy usually can be elicited.
- (6) Radiological examination reveals the presence of deposits of calcium within the aortic cusps or annulus'.

#### BASAL SYSTOLIC MURMURS

Murmurs are obtrusive and impressive signs, and, if the physician is uncertain of their origins. he necessarily lacks self-assurance and diagnostic discrimination. While pulmonary systolic murmurs are commonly due to physiological factors and mildly pathological states, aortic systolic murmurs frequently own a definitely pathological basis of varying significance. The aorta is thicker, less elastic and much longer than the pulmonary artery, hence the aorta offers more resistance to distension and at the same time affords accommodation for a larger stroke volume than does the pulmonary artery. Therefore the increased cardiac output and heightened systolic force of the overactive heart (of excitement, anæmia, fever, neurocirculatory asthenia, thyrotoxicosis and early hypertension) are seldom sufficient to produce appreciable dilatation of the aorta. On the other hand, the resultant physiological dilatation of the soft, thin, easily dilatable short pulmonary artery in the same hyperkinetic circumstances is usually responsible for the pulmonary systolic murmur, the commonest of all heart murmurs, heard in Balfour's 'area of pulmonary romance'. (The right lung apex behind is another area of auscultatory romance.) Dilatation of the pulmonary artery and of its 'ring' would of course result in relative pulmonary incompetence: dilatation of the aorta and its 'ring' would likewise produce relative aortic incompetence.

#### Causes of aortic systolic murmur

I. Relative stenosis due to-

(1) Cardiac overaction, e.g., in anæmia systolic murmurs are heard most frequently in the pulmonary area, next most commonly in the mitral area, the tricuspid area and the aortic area, in the order named.

(2) Simple dilatation of the aorta due to arteriosclerosis, chronic hypertension and syphi-

(3) Aneurysm usually of the ascending aorta.

II. Conditions favouring relative stenosis by producing kinking and so a tendency to proximal dilatation of the aorta, e.g., high diaphragm, as in extreme obesity, pregnancy, ascites and other forms of abdominal distension.

III. Absolute stenosis due to-

(1) Monckeberg's sclerosis of the aortic valve without evident aortic dilatation, productive of slight aortic stenosis in some elderly people.

(2) Aortic stenosis due to rheumatic valvulitis or calcification of the valves (rheumatic and non-rheumatic calcific aortic valves).

(3) Congenital aortic stenosis productive of

aortic dwarfism.

IV. Transmission of a systolic murmur from elsewhere, e.g., pulmonary area, mid-sternum, lower sternum, apex.

The systolic murmur of aortic stenosis

Acoustic characters.—The systolic murmur of aortic stenosis is characteristically loud and harsh. It may be rough, coarse, grating, croaking, vibratory, whistling, musical or even blowing. Rough murmurs bespeak stenosis, while rasping or tearing sounds often characterize the louder varieties of murmur associated with calcareous deposits on the valve, or marked stenosis. The murmur is apt to be very loud in recumbency. The loudness of the murmur is maintained until the grave heart failure of aortic stenosis supervenes, whereupon the murmur becomes less intense and may even disappear. The widespread transmission of very loud aortic systolic (stenotic) murmurs over the chest, back, vertex of head, sacrum and humeral condyles and their very occasional audibility, even at a distance from the patient, seems to support Cabot's view that 'the distance a murmur is transmitted is purely a function of its loudness'. Hence the 'loud and harsh aortic systolic murmur' postulated by White generally implies an obstructive stenotic murmur well conducted into the neck. Loud mitral stenotic murmurs are almost invariably confined closely to patient's cardiac impulse because in diastole the apex is not firmly applied to the chest with the result that the vibrations are rapidly lost (Cowan and Ritchie, 1935). Thus mitral (Cowan and Ritchie, 1935). Thus mitral stenotic murmurs fail to endorse Cabot's theory of the transmission of murmurs.

#### Timing

In aortic stenosis both the isometric and ejection phase of systole are prolonged. Sound records show that the isometric component of the first sound is clear of murmur provided that the disease process is limited to the semilunar valves. They also show that the murmur of aortic stenosis attains its maximum intensity in the phase of maximal ejection. Clinically, the loud and harsh murmur of aortic stenosis is early systolic in point of time, commonly masks the first sound and frequently extends throughout the whole of systole.

#### Punctum maximum

This corresponds with that of the accompanying thrill, namely, the clinical aortic area. The murmur may, however, be best heard over the manubrium sterni or even to the left of the sternum. Rarely, the cardiac apex is the site of maximum intensity of the harsh stenotic murmur, in which case mitral regurgitation is simulated as it may be to a less extent when a loud aortic systolic murmur is heard all over the præcordium. In both instances, transmission of the murmur to the lung bases behind, significant of mitral regurgitation, is notably absent. Moreover, mitral regurgitant murmurs are not transmitted to the base of the heart, nor are they audible in the neck.

#### Selective propagation

The transmission of the aortic systolic murmur of stenosis is characteristically widespread, because its vibrations are conveyed along the blood vessels in the direction of the blood current and also through the left ventricle, and because the louder it is the greater is its distance of transmission in accordance with Cabot's law, as stated above. Thus the murmur may be well conducted along the carotid and subclavian vessels into the neck and along the arms, it may be heard all over the front of the chest, and when it is heard in the back its point of maximum intensity precisely corresponds with the first point of contact of the aorta with the spine, namely, the fourth thoracic vertebra.

The transmission, however, of an aortic systolic murmur even into the neck is not pathognomonic of true stenosis: indeed, it is more frequently indicative of dilatation of the aorta with roughening of the intima. An interesting feature of aortic systolic murmurs is their tendency to 'tunnel', i.e., 'to travel some distance underground and emerge with a change of quality'—Clifford Allbutt. 'The murmur of aortic stenosis', remarks Cabot, 'is often heard well at the apex and at the aortic area and faintly in the intervening space, probably owing to the interposition of the right ventricle'. Levine, who followed up many instances of such 'systolic murmurs—cause unknown', observed, 'as years went on a definite basal thrill would become palpable or calcification of the valve would be found on x-ray examination'. 'Dyspnœa or anginal pain', he adds, 'were frequent eventual developments in such patients'.

#### THE THRILL

In the matter of physical signs in clinical medicine, not only is it vital to know them thoroughly and the precise technique of their elicitation but also to know when precisely to elicit them. Obviously, time for one thing does not permit a practitioner to perform all the tests in his repertoire every time he sees a new patient. With reference to aortic stenosis, Lewis aptly remarks that 'a harsh murmur is the hint to examine for thrill'. A thrill is the analogue of

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the murmur, the conditions necessary for its the marine, for its production being more exaggerated as a rule. In production production are generally palpable fact, low-pitched murmurs are generally palpable as thrills. The essential requisite for thrill production is a sudden change in the calibre of the blood stream from narrow to wide. The most intense systolic thrills are those of aortic stenosis and pulmonary stenosis. Intensifying factors are a thin chest, closeness of the occurrence of the thrill to the palpating hand, and speed of blood flow. A common associate of calcific aortic stenosis is pulmonary emphysema, which causes recession of the heart from the chest wall. The force of the thrill varies with the intensity and pitch of the murmur. Hence a loud and harsh aortic systolic murmur is attended by a thrill, and if the murmur is a gentle one no thrill at all is felt. Thus, if an aortic systolic murmur is not fairly loud, generally it may be ignored. It is important to remember that when heart failure supervenes in aortic stenosis the thrill, like the murmur, becomes faint. The fainter thrills of aortic stenosis are often missed owing to faulty technique. For their detection it is necessary to employ light palpation with the patient sitting up and leaning forward, particularly with his breath held in expiration, whereby the sternum and adjacent ribs come into closer contact with the aorta, and the intervening lung border is retracted. One should carefully search for thrill in this fashion in the second right interspace, and over the upper and middle portions of the sternum. Occasionally the thrill may be felt at the cardiac apex, where it may very rarely be better appreciated than at the base. If in doubt about a thrill, the answer is 'thrill is absent'. Definite sustained purring vibrations must be felt before the observer can declare that thrill is present. An overacting heart throws the ribs, and more especially rigid ribs, into vibrations with the production of a 'pseudo-thrill', in which case, if one separates the fingers and places them in the intercostal spaces, the osseous vibrations will not be felt. The transmission of the aortic systolic thrill is similar to, but less widespread than, that of the corresponding murmur, and is likewise non-pathognomonic of aortic stenosis. A systolic thrill maximal in the aortic area is an indisputable sign of aortic stenosis, provided the other causes of thrill to the right of the upper end of the sternum, more especially those due to relative stenosis, i.e., aortic dilatation and congenital heart disease, are excluded. The rarer causes of thrill to the right of the sternum are :—aneurysm of the ascending aorta or of the commencement of the aortic arch, aneurysm of the innominate or of the right subclavian artery, arterio-venous aneurysm (ascending ing aorta and superior vena cava) and compression of the aorta or its great branches by a mediastinal tumour or other factor. The thrill of arterio-venous aneurysm is continuous rather than simply systolic, especially over the site of perforation, i.e., in the area about the aortic

cartilage. Kurtz has described the occurrence in the supersternal notch of 5 to 6 visible vibrations with each systole of the heart in cases of well-marked thrill due to rheumatic aortic stenosis.

#### The aortic diastolic murmur

An aortic diastolic murmur is the rule in rheumatic aortic stenosis, whereas it is an inconstant accompaniment of calcific aortic stenosis. The post-mortem evidence of calcific stenosis clearly suggests that leakage is inevitable, nevertheless clinical evidence of such leakage is not infrequently wanting, which reminds us that the murmur of mitral regurgitation is often conspicuously absent in fully developed mitral stenosis. In either case, the louder one murmur becomes the less loud is the other; that is to say, the greater the stenosis, the less the regurgitation. At all events a deliberate search should be made for a basal diastolic murmur in all cases of suspected aortic stenosis. A soft and distant aortic diastolic murmur is notoriously elusive. Such a murmur may be heard best after exercise with the patient standing or sitting and leaning a little forward, which manœuvre brings the aortic valves nearer the chest wall. We then listen attentively, employing a Bowle's chest-piece or direct auscultation with the naked ear, especially when the patient holds his breath in full expiration. The aortic diastolic murmur commences abruptly with, and may somewhat blur, the second sound; it quickly attains its maximal intensity during the first moment of diastole and is both less intense and less prolonged than its dominant partner, the loud, harsh and prolonged systolic murmur of aortic stenosis. În aortic stenosis, a maximal intensity and more clearly waterfall character of the diastolic murmur in the left third interspace close to the sternum, i.e., approximately over the aortic valve itself, is highly significant of a rheumatic ætiology and of an undilated aorta. A loud aortic diastolic murmur should lead one to interpret a high intra-aortic pressure, the proof of a vigorous left ventricle, and a correspondingly less excessive leakage. 'The degree of aortic incompetence', Lewis reminds us, 'cannot be gauged from the loudness or length of the murmur'. A loud musical aortic diastolic murmur promptly excludes aortic stenosis in that such a murmur is usually due to retroversion or eversion of the right anterior aortic leaflet, produced by syphilitic involvement: a tear or rupture of an aortic valve is less commonly responsible for this loud musical murmur. The 'double aortic', beloved of students, is a finding of purely localizing value in that it implies nothing further than disease of the aortic valves. The confirmatory value of an aortic diastolic murmur in a case of suspected aortic stenosis is considerable in the absence of Corrigan's pulse, of alteration in the size and contour of the aorta and of evidence of syphilis.

#### The aortic second sound

The careful determination of aortic second sound intensity is regarded by some observers as being of more importance in the diagnosis of aortic stenosis than the study of the pulse. The classical quartette of signs of aortic stenosis, however, is the loud, harsh aortic systolic murmur, the corresponding thrill, the diminished or absent aortic second sound and the plateau pulse. The aortic second sound and the pulse changes being usually difficult of interpretation are relegated to the third and fourth positions.

The second sound, which definitely precedes the opening of the mitral and tricuspid valves, gives acoustic expression to the vibrations set up in the semilunar valves at the moment of their closure and also on the wall of the artery and in the blood column itself (Orías and Braun-Menéndez, 1939). In classical aortic stenosis, the aortic second sound is weak or absent because the stiff and rigid valve segments are incapable of snapping together. Total absence of the aortic second sound documents gross stenosis. Elsewhere a second heart sound of subnormal intensity is easily audible. Even in wellmarked aortic stenosis, the second sound is commonly heard at the aortic base and is due to the closure of the pulmonic cusps. Definite aortic stenosis can be present with a normal aortic second sound. The second sound, as heard at the aortic area, is the summation of the second sounds, originating in the aorta and in the pulmonary artery. Hence, when studying the aortic stenosis, it is advisable to auscultate the carotid artery also, where the aortic component of the second sound is isolated. Factors germane to consideration of aortic second sound intensity in aortic stenosis are the degree of stiffness of the aortic cusps, the presence or absence of an aortic diastolic murmur, the level of the systemic blood pressure, and the condition of the aorta. Extrinsic factors, such as obesity and emphysema, must of course never be overlooked in the evaluation of heart-sound intensity. A coexistent aortic diastolic murmur beginning abruptly in early diastole will somewhat blur the aortic second sound.

Lewis discusses accentuation of the aortic second sound in hypertension, wherein an accentuated aortic second sound is an expected, but by no means an invariable, finding. Obesity or emphysema may be responsible for its absence on occasions. Stiffness and enlargement of the aorta impart a slightly musical quality to the aortic second sound, hence an intoned or ringing aortic second sound suggests changes in the aorta rather than in the aortic cusps. Thus, in hypertension when the aortic second sound is reduplicated and ringing in quality (bruit de tabourka), the ringing quality is to be ascribed to sclerosis and calcification of the aorta and not to the hypertension. In aortic sclerosis without hypertension, the aortic second sound may be greatly accentuated and ringing, owing to the close approximation of the sclerotic unfolded aorta to the chest wall. Otherwise stated, an aortic second sound with a characteristic snappy emphasis, comparable to the note of a small drum, is highly significant of aortic dilatation, especially if associated with normal blood pressure. As a general rule, therefore, state Norris and Landis (1933), if the aortic second sound is normal and more especially if it is loud and ringing in character, the systolic murmur heard at the aortic base originates in the aorta and is not due to rigid and diseased aortic valves. In calcific aortic stenosis the first part of the aorta is often remarkably free of atheromatous changes, owing to buffering by the calcific valves. Cabot's remark concerning the aortic second sound in certain cases of aortic stenosis is at least stimulating.

'Another strange fact is that even in a case with rigid and immovable valves the aortic second sound may not only be audible but may be actually accentuated and the systolic blood pressure high. How physiologists would account for this I do not know. So far as I see, it definitely attacks the theory, ordinarily held by physiologists, that the aortic second sound is due to the closure of the aortic valves and to this cause alone.'

We do not blame our physiologists for this apparent discrepancy.

#### THE PULSE

The study of the pulse by palpation and tracings has greatly declined since the introduction of the baumanometer and the electrocardiograph. These instruments are of course infinitely more accurate in their assessment of pulse quality and rhythm: the rate being best obtained by auscultation of the heart. Nevertheless, it appears from Dudgeon's writing (1882) that the nineteenth-century physician armed with his 'loud-ticking gold chronometer' was at least more mysterious and consequently a greater oracle in his day.

'The physician of old made his diagnosis chiefly by observation of the pulse and tongue. But as the tongue could be rapidly inspected, and anyone could judge of its foulness or cleanness as well as himself, he concentrated his attention mainly on the pulse, in the feeling of which there was always scope for affecting the possession of peculiar skill and insight. To the uninitiated, who regarded the doctor as a depository of occult knowledge, and who received his dicta as though they were oracles, there was something very imposing in his method of pulse palpation. The fingers of the right hand daintily grasping the patient's wrist while the doctor's eyes are riveted on the loud-ticking gold chronometer he held in his left hand, his head gravely nodding the while synchronously with the arterial pulsation—all this formed a picture calculated to inspire beholders with reverence and awe."

'The outstanding diagnostic sign of aortic stenosis is a small pulse, rising slowly to a delayed summit . . Aortic stenosis should never be diagnosed without this sign 'Lewis. The characteristically slow, small, retarded pulse (pulsus rarus, parvus, tardus) is the peripheral expression of 'pure' aortic stenosis of high-grade severity. Its wave conveys to the finger the impression of a gradual rise to a summit which

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is unduly prolonged in the form of a plateau. The sustained plateau is best appreciated by palpation with the approximate fingers simulpaipausly, when the pulse wave will be felt to take time to pass the palpating fingers, like a crowd going through a door. Left ventricular hypertrophy may compensate for the stenosis, and so the size of the pulse may be approximately normal. Whereas the plateau pulse feels full between the beats, Corrigan's pulse feels empty. The slow rise bespeaks obstruction to the ejection of blood from the left ventricle into the aorta due to the absolute narrowing of the valvular orifice. Anacrotism, or the presence of an additional wave on the upstroke of the pulse, marks the transition from a rapid to a slower ejection by the left ventricle.

The causal factors of this sudden change of ventricular tactics are not yet precisely known. The valvular obstruction and perhaps coincident arteriosclerosis are probably responsible. The anacrotic pulse is more diagnostic of aortic stenosis than the pulsus bisferiens, or the double pulse beat, but it is not pathognomonic of stenosis in that it is also observed in conditions of obstruction distal to the aortic valve, e.g., aortic aneurysm, compression of the radial artery by a tumour proximal to the site of palpation, severe arteriosclerosis, etc. Both the anacrotic pulse and the pulsus bisferiens are usually more evident in pulse tracings than they are to the palpating finger. Another feature of the classical pulse of aortic stenosis is delay, i.e., increase of the normal interval between the cardiac apex and the radial pulse to perhaps one-fifth of a second, which increase is most evident on simultaneous auscultation of the heart and palpation of the radial pulse. This retardation of the pulse is connoted by tardus. The heart rate in aortic stenosis is often remarkably slow, even 50 to 60 beats per minute, in the absence of heart block and digitalization.

Harrison (1939) suggests that the carotid sinus is reflexly concerned in the prolongation of systole common in these cases and that the duration of diastole is correspondingly lengthened, which conditions tend to delay the onset of the next heart beat. Levine remarks—'the slow heart rate may possibly be due to the same factor that makes the patient subject to syncope, or may in some way be related to the vagus apparatus'. However it may be, the bradycardia of aortic stenosis maintains a satisfactory diastolic pressure, thus seizures, which tend to occur with higher heart rates. Most patients with congestive failure exhibit tachycardia and may have arrhythmias. In aortic stenosis, however, the heart rate, even in advanced congestive failure, may be under 70 or 60 in the absence of heart block and the moreblock and digitalis therapy. The rhythm, more-over, is generally regular. Such a congestive failure or facility failure, or for that matter any congestive failure of obscure actiology, should always remind one of the possibility of the Possibility of calcific aortic stenosis. The

three characteristic pulses of valvular disease of the heart are Corrigan's pulse, significant but by no means pathognomonic of aortic regurgitation, the plateau pulse of aortic stenosis, and the small pulse with firmness found in mitral stenosis. Corrigan's pulse is a popular finding not only in aortic regurgitation but also in conditions of peripheral vaso-dilatation and high pulse pressure, e.g., Graves described it in hyperthyroidism, it may be a conspicuous feature of certain anæmias, it is a common feature of neurocirculatory asthenia and during fevers: it may be observed in some cases of hypertension.

For the occurrence of Corrigan's pulse in aortic regurgitation, the leak must be appreciable and the left ventricle must be fairly powerful. Hence in cases of slight leakage, widely-gaping aortic orifice, or of left ventricular failure, Corrigan's pulse is absent or indeterminate. Its form is the antithesis of the plateau pulse and both aortic stenosis and mitral stenosis definitely modify it. The classical plateau pulse is not a feature of the majority of the cases of aortic stenosis. The young rheumatic group, for example, is characteristically polyvalvular and so the pulse is the resultant of aortic stenosis, aortic incompetence, and perhaps of mitral stenosis. Aortic stenosis tends to lessen both the rise in systolic pressure and the fall in diastolic pressure due to aortic regurgitation. Mitral stenosis modifies the signs of aortic regurgitation in much the same way. In the calcific group, in addition to the usual presence of aortic leakage, one not infrequently finds a complicating hypertension, the classical pulse of which is described as 'magnus, durus, tardus'-large, hard and slow.

Other associates of the elderly group are arteriosclerosis and renal disease. Both groups may exhibit a superimposed neurocirculatory asthenia. Obviously the pulse, like the aortic second sound, is often difficult of correct interpretation. 'Indeed I have in two cases observed a well-marked "Corrigan" pulse in life, and been confronted post mortem with a narrowed, rigid aortic valve!' Cabot's perplexity is eloquent.

#### The cardiac impulse

The characteristic cardiac impulse of gross aortic stenosis is large, rises gradually, is overlong sustained and leads to a slow, deliberate and well-defined displacement of the thoracic wall, downwards and slightly outwards. Briefly, it displays increased force and a slow and deliberate out-thrust. 'The out-thrust of the apex beat may be even slower and longer than in the case of hypertrophy—"slow heave", which is sustained'—Price (1937). It is reminiscent of the slow steady heave of a bullock starting to drag a heavy bullock cart. Libman suggests that the contrast between the slow heaving cardiac impulse and the absence of retromanubrial pulsation may afford a clue to the recognition of

aortic stenosis. Broadbent describes the cardiac impulse of aortic stenosis as 'a well-defined and deliberate out-thrust of no great violence'. The distinctive impulse should be compared with the delayed flat-topped pulse wave of small or average volume. When heart failure supervenes, the slow heaving impulse of aortic stenosis becomes more diffuse. The combination of a feeble first heart sound and a heaving impulse is as significant of cardiac failure as it is striking to the observer.

#### The first heart sound

Four factors—muscular, valvular, vascular and auricular—contribute vibrations to the first heart sound (Orías and Braun-Menéndez, 1939). For the normal production of the first heart sound mitral and tricuspid valve closure must be prompt and efficient, and strong ventricular muscle must produce a sudden well-marked presphygmic tension preceding the outflow of blood. Two groups of ventricular vibrations are essential for the formation of the first heart sound: the first group, produced by the sudden contraction of the ventricle, is known as the isometric component, and the second group, produced by the opening of the semilunar valves, is called the ejection component. Furthermore, the intensity of the first heart sound varies directly with the rate of rise of intraventricular pressure during systole and does not depend on cardiac output (Wright, 1936). The degree of tension to which the mitral and tricuspid valves are subjected at the beginning of systole, is the other principal factor determining the intensity of the first heart sound. Recently, Stead et al. (1939) concluded that in normal hearts the position of the auriculo-ventricular valves at the beginning of ventricular contraction is the primary factor in determining the character of the first heart sound. Variations in the P-R interval within normal limits, they observed, may produce striking alterations in the first heart-sound intensity. In aortic stenosis there is obstruction to the outflow of blood and consequently a super-normal intraventricular systolic pressure with prolongation of both the isometric and ejection phases of systole. Hence the first sound at the apex in aortic stenosis is typically booming, i.e., prolonged, low-pitched and resonant, signifying concentric left ventricular hypertrophy. At the aortic base the first sound is commonly masked from its commencement by the loud harsh aortic systolic murmur. Marked proharsh aortic systolic murmur. longation of the first sound in aortic stenosis may be the whisper of an approaching gallop rhythm, indicative of left ventricular failure. Presystolic gallop rhythm is 'the cry of the heart for help'. Not rarely, however, gallop rhythm suggests the presence of bundle branch block, which is sometimes a helpful diagnostic feature of calcific aortic stenosis. The Austin-Flint murmur is interpreted by some as a presystolic gallop rhythm (Laubry and Pezzi, 1926).

#### Blood-pressure readings

Classical aortic stenosis exhibits a low systolic and relatively high diastolic pressure, e.g., a frequent reading is 110/90. The resultant is a small pulse pressure. We have already referred to the influence exerted by the stenosis on the commonly associated aortic leakage, which influence is less notable in rheumatic stenosis. Reference was also made to the fact that the essential hypertension not infrequently complicates the calcific group. 'To some extent' remarks Willius, 'the height of the blood pressure bears an indirect relationship to the degree of stenosis, although even in extreme degrees of stenosis severe hypertension and all its peripheral associates may occur'.

Speaking of blood-pressure readings, I might mention in passing that John Parkinson constantly insisted that 'there was no such disease as low blood pressure'. 'Usually', said Stroud (1939), 'individuals with low blood pressure can be patted on the back and told that God has been very kind to them. They do not accomplish quite as much as the high pressure individuals, but they are wonderful from the standpoint of the physician. They never feel quite right, they are always coming back to them and they live for ever'. The fat type of Bengalee gentleman is rather more concerned with high blood pressure: indeed he not infrequently displays Musser's syndrome, namely, obesity, hypertension and glycosuria. 'In old age, when the aorta is sclerosed, the diastolic pressure may be relatively low, and such a reading as 200/90 obtained. These readings may not be indicative of true hypertension'-East and Bain (1936).

#### Electrocardiographic changes

The electrocardiogram in aortic stenosis expectedly reflects left ventricular strain. This is evidenced electrocardiographically by (1) left axis deviation and by (2) changes in the T-wave in lead I or in leads I and II. Disturbances of rhythm may be present also.

#### Axis deviation

Left axis deviation is the common finding. A large excursion of R in lead II is not uncommon. The differential effect in the two ventricles caused by combined aortic and mitral lesions may be shown by left axis deviation, right axis deviation, or no preponderance. Auricular fibrillation is usually associated either with right axis deviation or with no preponderance of either ventricles. This, in the opinion of Willius, suggests that as long as the left ventricle carries the major strain, the auricles are far less likely to fibrillate than when the reverse is true.

#### T-wave changes

Inversion of T-wave in leads I and II is due either to factors which act directly upon as muscle or to a change in sequence of invasion as in bundle branch block. In the latter case,

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T-wave changes are associated with QRS T-wave changes. In a ortic stenosis, with the development of left axis deviation, the T-wave in lead I becomes flattened and finally inverted. Such becomes in the T-wave in lead I may be indicative of the beginning of a not uncommon conduction disturbance in calcific aortic stenosis. refer to left bundle branch block, which may sometimes be explained in these cases by an extension of the calcific process from the aortic valve to the bundle branch. Inversion of T in leads I and II is common in great enlargements of the left ventricle, when it may signify a relative myocardial ischæmia, due more to the enormous muscle mass increasing the territory of the coronary circuit than to the decrease of the coronary blood supply by the lowered cardiac output of aortic stenosis. T-wave changes in leads II and III suggest the presence of a complicating factor, such as mitral stenosis or pulmonary arteriolar sclerosis, in both of which cases right axis deviation will be in evidence. Otherwise digitalization or coronary infarction may provide the explanation. T-wave changes in all three leads suggest a complicating mitral stenosis or some other less easily discernible factor. A diphasic T-wave in lead I or II of the T type has the same significance as inversion of the T-wave. T-wave inversion tends to lengthen the relative duration of systole. It is much less ominous in aortic stenosis than when associated with grave myocardial involvement.

#### Diagnosis

The clinical diagnosis of aortic stenosis should be primarily founded upon the secure basis of a fairly loud aortic systolic murmur and its corresponding thrill, as described above. If a diagnosis of aortic stenosis is going to be made by physical signs at all, the murmur and thrill are fundamental signs without which diagnosis will generally proceed uncertainly, until radiological and electrocardiographic aid are invoked. In the mofussil such instrumental assistance is rarely available. Amongst the foremost contributors to our present knowledge of aortic stenosis are Christian and his former pupil Levine.

Without the thrill in addition to the murmur, it is unsafe to make a diagnosis of aortic stenosis. If diagnosis is limited to the cases which present both the thrill and the murmur, the percentage of correct will be missed for we do see aortic stenosis in which will be missed for we do see aortic stenosis in which Ro thrill is produced or even without a murmur. Sometimes this failure to feel a thrill and hear a nurmur results in examining the patient only in the marked (Christian, 1935).

The clinical diagnosis of certic stenesis will in most

The clinical diagnosis of aortic stenosis will in most see depend on facilities of aortic stenosis will at the base of cases depend on finding a systolic thrill at the base of the heart, (Levine, 1936).

The next step is a diligent search for an aortic diastolic murmur. Its discovery will aid a focal diagnosis of aortic valve disease, and will further suggest that the loud aortic systolic murmur besneals and the loud aortic systolic murmur bespeaks absolute stenosis. The intensity of the aortic second sound should then be carefully

estimated in the manner described. Its decrement confirms a diagnosis of absolute stenosis. In the absence of a typical plateau pulse, the observer should at least satisfy himself that the pulse is not an unmodified Corrigan pulse. The first heart sound, the cardiac impulse, and the neck and radial pulses should be studied and contrasted the one with the other. The variability of the blood pressure and the connected factors are briefly discussed above. In emphysematous and obese calcific aortic subjects especially, x-ray examination is the only precise method of determining heart size, especially left ventricular enlargement and local or general aortic dilatation: the technique of visualization of the calcified valves is described by Sosman and Wosika (1933); left auricular enlargement finally confirms any clinical signs of mitral stenosis. The electrocardiographic findings in the calcific group have been recorded. Those in the rheumatic group likewise add to the completeness of the clinical picture, e.g., the type of preponderance or neutralization, the severity of the cardiac lesions, the progression of carditis, and so forth.

A pure rheumatic ætiology is indicated by the youth of the patient, and a previous history of rheumatism or the presence of mitral stenosis clinically or enlarged left auricle radiologically and the electrocardiographic picture. The calcific group, on the other hand, is over fifty, has a distinctive symptomatology, exhibits conduction disturbances electrocardiographically, and perhaps calcified valves on fluoroscopy. have already referred, under 'syncope', to the differentiation of calcific aortic stenosis from arteriosclerotic heart disease or coronary artery disease.

Sosman advises us to suspect the possibility of combined rheumatic aortic stenosis and syphilitic aortitis in cases of obscure and bizarre cardiovascular disease in which there is a history of previous rheumatic fever and clinical evidence of syphilis. Clinically, it is usually impossible to establish the diagnosis of such a combination, which occurs more frequently in localities with a higher incidence of syphilitic aortitis. There is, however, no clear evidence as yet that one predisposes the heart to a subsequent infection by the other.

#### Prognosis

'Rheumatic aortic stenosis', Campbell (1937) tells us, 'is of serious significance in the young subject, its gravity being related to the size of the heart: but if all signs and symptoms are favourable, aortic stenosis is compatible with a good prognosis'.

The subjects of calcific aortic stenosis, and more especially those with angina pectoris, dizziness, syncope, conduction disturbances and marked cardiac enlargement, exhibit a distinct liability to sudden death, sometimes in the midst of their usual health, that is, before heart failure

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has finally supervened. In such cases the occurrence of sudden death may be very occasionally explained on a mechanical basis, namely, by locking of the valve by an unusually forceful diastolic recoil thrust, or by thrombotic occlusion of the stenotic aortic orifice, as may happen in very rare cases of mitral stenosis with a ball thrombus in the left auricle. In some cases of calcific stenosis the cardio-inhibitory action of a hypertensive carotid sinus may be productive of cardiac standstill and sudden death. More usual explanations of sudden death in calcareous disease of the aortic valve are ventricular fibrillation, the result of oxygen deficiency due to severe myocardial ischæmia, which may also produce high-grade heart block with consequent cerebral anæmia or cardiac standstill. coronary occlusion caused one death in Willius' series: another case of his exhibited all the features of coronary thrombosis, including the classical electrocardiographic pattern, yet necropsy revealed no evidence of any such vascular accident. Incidentally, a single attack of acute cor pulmonale may produce a remarkable clinical and electrocardiographic likeness of acute coronary disaster without morphological evidence of coronary insufficiency. The physician in charge of a puerperal case, for example, may invite one to see an acute pulmonary embolism whose clinical features, namely, shock, sudden air hunger, sense of impending dissolution and substernal oppressive pain, have not unreasonably raised a suspicion of coronary thrombosis. As a matter of fact, when the pulmonary artery or its main branches are suddenly obstructed, the lesion is in effect a coronary one, in that the increased tension in the right ventricle diminishes the blood flow through the right coronary artery with consequent coronary insufficiency, myocardial ischæmia, and a preponderantly right coronary pattern of the electrocardiogram. Coronary thrombosis itself implies a progressive degenerative arteriosclerotic process with eventually initial hæmorrhage, thrombosis, and occlusion of a coronary vessel, in this order. Lest the gravity of calcific aortic stenosis has been rather over-emphasized, we shall cite the cases of the Latin professor and college dean, who had evident valvular heart disease for at least 25 years. In his sixty-third year the professor consulted White (1932), who found marked calcific aortic stenosis and considerable cardiac enlargement but no congestive failure. 'During the follow-ing one and a half years he did very well' re-marked White, until one summer 'he was fatigued by college commencement exercises and the hot weather, and then motored off into the country nearly 200 miles in one day'. That night the professor not undeservedly had an attack of pulmonary œdema. He died a few months later. 'The first qualification of a physician is hopefulness'-James Little. And at the bedside of a heart case a great deal too much optimism is, to quote Lindsay, a venial error compared with a little too much pessimism.

'As a rule', remarks Levy, 'even those, who stoutly assert that they "want to know everything", prefer to hear a word of encouragement. If you feel inclined to flourish the sword of Damocles, you might advisedly recall the observation of Wilks, that 'the sleeping accommodation of all the London hotels would be insufficient to put up the individuals walking about the city who had at some time or another been condemned to death by the medical profession'.

#### Myocardosis

Hyman and Parsonnet in introducing their Failing Heart of Middle Life (1932) informed us that

'The intense publicity given (heart disease) by every agency has swept into many a physician's consulting room individuals who had never before sought medical advice. Probably no phase of health propaganda has excited more interest among the laity than the problem of heart disease. Presented by the startling fact that heart disease leads all other causes of death, notwith-standing the tremendous publicity given to cancer and tuberculosis, many persons have besieged their doctors to examine them and to allay their fears of sudden death from heart failure. With the daily press constantly relating the sudden demise of some prominent citizen from causes said to be heart disease, the problem is more sharply brought to the attention of newspaper readers approaching middle life.'

The writers tactfully met this situation by 'an attempt to portray for the reader a more or less tangible and subtle picture of the failing heart before there are demonstrable objective signs of frank cardiovascular pathology '—the so-called myocardosis syndrome. From the outset we have discountenanced their equivocal term 'myocardosis', convinced as we are in the truth of Stroud's remark that a great many of these 'failing hearts of middle life' are merely introspective, apprehensive individuals who are afraid of heart disease but have nothing wrong with their cardiovascular systems any more than God expects them to have as they grow older.

Willius (1931) found abnormal electrocardiograms in 55 per cent of 700 people over the age of 74 years. Everybody naturally is afraid of heart disease and in America its danger and fatalities have been disastrously over-emphasized by every agency, for example by pamphlets such as 'How is your heart', by posters entitled, 'Your heart is a pump, take care of it, complete with a picture of a pump and a skeleton working at the handle, by broadcasts on heart disease, by overcautious physicians, and by divers other means. In his presidential address to the American Heart Association in 1939, Dr. Stroud admitted that all this heart disease propaganda, originally designed to prevent heart disease, has been a source of worry to him for many years in view of the very many imaginary heart-disease sufferers it had produced. In Stroud then appealed to the profession in America 'to dispel some of the fear in the mind of the average manufacture of the saverage manufacture. of the average man concerning cardiovascular disease'. He condemned the publicity methods mentioned above and expressed his agreement , who everynent, ord of obsermodafficient e city con-

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with the sound British attitude by his remark with the English certainly feel that we are taking grave chances in bringing too much of this subject before the public, which is not well this subject both to really understand what it is all about. Certainly, learned addresses to public audiences on 'sudden death' and on what the Irishman calls 'coroner's thrombosis' are not in the public interest. 'Certainly', continued Dr. Stroud, 'we have enough to be afraid of nowadays—social security, wars in Europe, many, many things. If we give our patients a philosophy of life and hope and faith, I believe that we are helping them more than if we make them fearful'. Problems in regard to sudden death and the Insurance and Workmen's Compensation Acts increasingly worry the American lawyer to-day. But he is not complaining. All these considerations decided us to exclude 'myocardosis' from our heart diagnoses in India; 'myocardosis' and 'silent heart disease' are much too subtle for the general public.

#### REMARKS

Clinical features are stressed throughout this paper because the fundamental basis of a sound knowledge of heart disease is necessarily clinical. Furthermore, substitution procedures such as electrocardiography are not really available to the rural practitioner who is still compelled to rely entirely upon his previous clinical training, stethoscope, blood-pressure instrument and watch for his cardiac diagnosis. The relative value of the different procedures employed in the investigation of a heart case is clearly stated by White (1937) in his Heart Disease. 'Electrocardiography', he said, 'ranks third in value after history taking and physical examination: cardiovascular radiography ranks fourth'. 'The electrocardiograph', he insisted, 'does not take the place of such other methods of examination as history taking, percussion, auscultation, and radiography '.

Obviously no cardiologist would attempt to exalt electrocardiography by depreciating clinical investigation. On the contrary, Diseases of the Heart by Lewis (1937a), the foremost authority on electrocardiography, is the finest appreciation of clinical heart disease I know. We briefly discussed cardiac symptoms and signs in a previous paper (Kelly, 1939). The doubtful symptoms and signs displayed by obese and emphysical displayed by obese and emphysematous subjects had been discussed already: already in some detail in Recent Advances in Cardiology (East and Bain, 1936) and x-ray examination and electrocardiograms advised. John Parkinson, however, remarks that 'when a patient the sternum a patient complains of pain about the sternum when he complains of pain about the sternum when he walks, the diagnosis of a healthy heart is out of the walks, the diagnosis of a healthy heart innocent is out of the question'. The most innocent undergraduate knows that an isolated symptom or sign ropel. or sign rarely makes a diagnosis, any more than that one swallow makes a summer'. 'Experience teaches', says Lewis, 'that to place reliance

upon a single sign is precarious. Compare this sign with that, and confident recognition of the patient's state grows as these signs group themselves together to form a harmonious picture'. We used neurocirculatory asthenia to illustrate this linkage of symptoms and signs to form a clinical picture, which incidentally had not heretofore been sufficiently emphasized to the general practitioner in India. 'The modern routine examination of heart cases', we said, includes clinical, electrocardiographic radiological examination'. The case reported demonstrates how the latter procedures corroborate and supplement the clinical findings. The routine investigation of a heart case in the outpatients' department of the National Heart Hospital, London, is as follows: The technician takes the electrocardiographic tracings of the case before the physician's arrival. The tracings are then taken over by the sister in charge, who places them in their rack in the physician's room. The physician personally takes the history, performs the physical examination and makes a clinical diagnosis in each case. The appropriate electrocardiogram is now picked out of the rack and handed to the physician, who interprets it in conjunction with the clinical picture. When all the cases are thus disposed of, the patients are taken to the x-ray department. The physician personally screens each case and outlines on tracing paper the radiological configuration of any case of special interest, correlating all the while the clinical, electrocardiographic and radiological findings. The technical assistant in most electrocardiographic departments 'rattle off' electrocardiographic findings, e.g., arrhythmias, on sight. They fail, however, to attain the status of the physician in that they cannot correlate the electrocardiographic with the clinical findings. The physician in charge of a case should not regard a mere statement of electrocardiographic findings, such as technical assistant may provide, as the electrocardiographic interpretation of his case.

Clearly, every physician should interpret the electrocardiographic findings of his own cases in the light of his clinical knowledge of them. To this end physicians should acquaint themselves with the essentials of clinical electrocardiography. These are to be found in Clinical Electrocardiography (1937) by Lewis, who tells us that this handbook of only 120 pages is intended to serve as an introduction to students of electrocardiography and as a guide to practitioners and hospital physicians in understanding curves that may be taken by others from patients in their charge'. Lewis deals in his excellent way with disturbances of the cardiac mechanism. There is a great and rapidly increasing demand by the American practitioner of medicine who does not intend to specialize in cardiology for handbooks designed to give him a grounding in electrocardiography. Essentials of Electrocardiography by Ashman and Hull (1937) is such a handbook. These writers state

that they 'have removed the emphasis from disturbances of the cardiac mechanism and have placed it where it belongs, namely, upon the abnormalities, which reveal or suggest the existence of myocardial disease'.

The rough summation of an electrocardiogram consists in the simple addition of the observed deviations from the normal. Leads I and II are particularly scrutinized for abnormalities, which are usually less significant if confined to lead III. One minor electrocardiographic abnormality may be disregarded. The addition of several inconclusive deviations equals heart disease just as does the sum of several inconclusive clinical findings. Chest leads are of much value and should be requested more frequently, especially lead IV, F.

In the not too distant future the lag-screen belt electrocardiogram will be a commonplace adjunct in the bedside diagnosis of heart cases in India, as it already is in America. This enables the physician, who can interpret electrocardiograms, to see precisely what is going on in the heart. In fact, some physicians have already complained that the machine is not infrequently a source of embarrassment, in that it compels a decision on the spot as to treatment, whereas formerly the physician could look the matter up quietly while the film was being developed. Large numbers of army recruits with alleged heart disease could be quickly and finally disposed of by the lag-screen method of Asher.

'Finally', concluded White, 'it must be realized that the electrocardiogram may be perfectly normal even in the presence of serious heart disease'. The truth of the latter remark is specially emphasized by Lewis (1937)—'It is to be recognized', he said, 'that a thrombosis may happen in the coronary arterial system without appreciable change being displayed then or subsequently in the electrocardiogram'. Thus there are silent areas in the myocardium as well as in the frontal lobe. Nevertheless, I do not propose to disturb the profession or the public by over-stressing silent heart disease. The phrase is too sinister, too suggestive of sudden death, especially to the middle-aged man, who not unreasonably derives much consolation from the thought that his doctor can 'spot' something wrong with his heart by some means or other, and thereby forestall what is dramatically described as a myocardial catastrophy. The thirdyear medical student is aware of the dangers of dual failure in diphtheria, and the general practitioners I have met never fail to suspect circulatory failure in a case of diphtheria whatever the signs. The remarks of Boyle et al. (1939) concerning this circulatory failure are not un-'Surprisingly', they said, 'death interesting. from this cause is frequently not entirely explained by the pathologic changes in the heart. The frequent paucity, or even absence of cardiac lesions, contrasted with the dramatic collapse in

diphtheria, has led some authors to look elsewhere for the cause of death, or to hypothesize a functional alteration of the myocardium' Paul White's attitude towards electrocardiography is well balanced. 'This method of study', he said, 'should be viewed modestly as helpful and supplementary but not accorded too great importance'

Dr. Stroud (1939) has recently expressed considerable anxiety 'concerning unnecessary fears developed through electrocardiographic interpretations. He recalled Sir Thomas Lewis' last

words to him-

When you return to the United States, you must be careful in using the electrocardiographic galvanometer. Remember that the United States is a young country, and Americans are impressionable. They believe that almost anything may be accomplished through mechanical or scientific effort. If you use this machine, then look at the tracings in front of the patient, then look at the patient and shake your head, that patient is probably a cardiac cripple for the rest of his life.'

Stroud then tells of the awe inspired by electrocardiographic apparatus in the not-so-intelligent patient. He tells of the patient about to be electrocardiographed who appealed, 'Doctor, do you mind if I say a little prayer before you turn the thing on': and he tells of the slightly more intelligent patient who remarked to him a week after the tracing was made-' Doctor, I feel ever so much better since I took that electrocardiographic treatment'. Finally Dr Stroud continues-

'I believe that with all these machines now being sold throughout the country, we must be sure to educate not only the public, but also the medical profession, as to the relative importance of the electrocardiogram. We must persuade doctor and patient, alike, that it is impossible to read from the electrocardiogram alone the last word as to the future of the cardiovascular system. I am positive that all too many physicians are attempting to read from the electrocardiogram more than is justifiable.'

#### Case report

On the 12th of April, 1939, a 25-year-old Hindi tutor, S. N. S., had a syncopal attack which so alarmed him that he sought admission to the Medical College Hospital Calcutte that Hospital, Calcutta, that evening.

His family history was negative. He had malaria and eczema in childhood. At the age of ten he was confined to bed for several weeks on account of a moderately some moderately severe grade of fever, attended by sore throat and flitting arthritis. For a whole year thereafter he had an evening toward the had an evening toward the had an evening toward to a solution. he had an evening temperature and experienced palpitation and dyspnœa whenever he tried to get about. In fact, ever since he had that long-drawn-out fever fourteen ways and had that long-drawn-out that fourteen years ago he has constantly noticed moderate exertion brings on some degree of palpitation together with a less degree of dyspnæa. From time to time in the past five years a feeling of mild general weakness comes over him. Lately, he has been having night starts and bad dreams and also feelings of faintness. To-day he had an attack of actual syncope.

Physical examination

The patient was a moderately well-developed and well-nourished young man of average height. Well-nourished young man of average height exhibited slight pallor, mild acne rosacea, and some nervousness. His temperature was 98.6°F. His pulse was regular at a rate of 82: the right radial pulse a slightly jerky character and both radials were appreciably thickened. The respiratory rate was 20: signing respiration was not evidenced. His blood pressure was

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135/65 right arm, and 125/80 left arm; his subclavian 135/05 right and carotid pulses, however, were equal. He weighed 144 pounds dressed.

4 pounds diesecthe head and neck, including observa-Examination of the head and neck, including observa-tion for carotid pulsation, revealed nothing abnormal. The pupils were equal, central, regular, moderately dilated, and reacted well to light and in accommodation. dilated, and reacted wen to light and in accommodation.
The throat was apparently healthy: the related glands were impalpable. The mouth seemed healthy.
The lungs were normal to percussion and auscultation.

#### Heart

The præcordium was slightly prominent. The obviously heaving apex impulse was diffused in the fifth and sixth interspace to about half an inch outside the left mid-clavicular line. The maximum apex impulse was found in the left fifth interspace in the mid-elavicular line. A well-marked systolic thrill was palpated at the aortic base, maximal at the junction of the right second costal cartilage with the sternum.

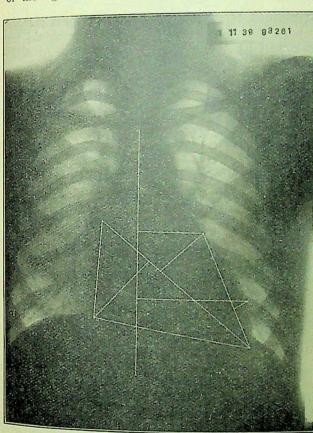
The abdomen was flat: there was no tenderness or rigidity and abdominal organs were not palpable.

The extremities were normal.

The reflexes were hyperactive and equal.

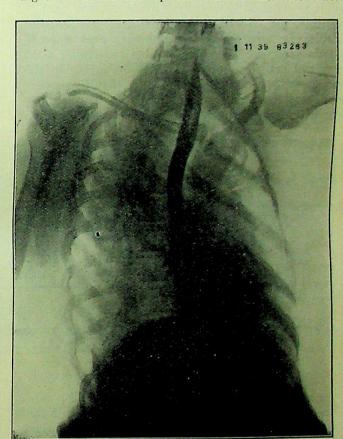
#### Electrocardiographic findings

Normal rhythm. A and V rate 72 (lead II). P-wave slightly prominent. P<sub>2</sub> width = 0.12 sec. (over 0.1 sec. in lead where it appears to be widest), P<sub>2</sub> height 3 mm. (over 2.4 mm. in lead II). P-R interval = 0.22 sec. (0.20 sec. is upper limit for large adult with a heart rate of 72). No deviation of electrical axis. QRS interval = 0.08 (not over 0.10 sec. in lead II. R<sub>1</sub> slightly slurred upstroke and downstroke especially near base slurred upstroke, and downstroke especially near base.  $R_s$  upstroke slurred (position of slurs fairly constant, i.e., not caused by the alternating current oscillations) RST segments show apparently low and high take off of slight degree in leads I and III, respectively, due to slight downward and upward drift of the base line.



Antero-posterior position.

There was no supra-cardiac dullness. The low-pitched, prolonged and somewhat muffled apical first heart sound was modified by the presence of an emphatic component and was attended by a short systolic murmur. An aortic diastolic whise commenced with the second sound at the apex which was followed by a low-An aortic diastolic whiff commenced with the second sound at the apex, which was followed by a low-pitched mitral diastolic rumble with mid-diastolic accentuation. At the site of maximal intensity of the aortic systolic thrill, a loud, harsh, early systolic murmur was heard, masking the first heart sound at the aortic base and extending throughout the greater part of the neck, down towards the apex and slightly into the diminished in intensity and slightly blurred by a smooth soft diastolic aortic murmur, the distant point of maximum intensity, namely, in the left fourth interspace of the neck, in the second sound in the aortic area was smooth soft diastolic aortic murmur, the distant point of maximum intensity, namely, in the left fourth interspace of the second was point of maximum intensity, namely, in the left fourth interspace close to the sternum. The second sound was absent over the carotid artery. The first heart sound was easily audible in the pulmonary area and the second was accentuated. second was accentuated.



Right oblique position.

T-waves diphasic. Q-T = 0.36 sec. Normal (upper limit for this cycle length of 0.84 sec. = 0.384 sec.). I acknowledge my thanks to the electrocardiographic department for the tracing (see page 144). The findings are the writer's.

#### Radiological examination

The professor of radiology reported as follows:- 'The heart shows considerable general enlargement. The aortic shadow appears normal. The œsophagus shows slight deviation as by an enlarged left auricle'. This report is confirmatory of the writer's fluoroscopic findings.

#### Laboratory findings

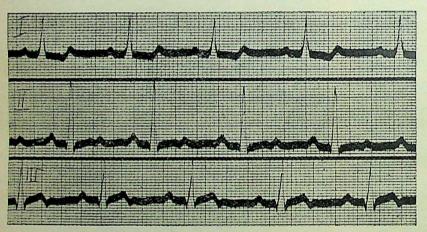
Blood.—Hæmoglobin—75 per cent; R.B.C.—4,500,000; and W. B. C.-6,120.

Sedimentation rate.—Within normal limits. Blood Wassermann reaction.—Negative.

Throat.—Streptococcus hæmolyticus, pneumococcus, M. catarrhalis, and Staph. albus.

On culture-no Klebs-Löffler bacilli.

Comment.—This patient is evidently introspective and apprehensive. His reflexes and emotional responses are brisk. There is nothing, however, that shakes the general morale of any individual more than the occurrence of attacks of faintness or actual syncope. The underlying mechanism responsible for syncope in young people is usually neurogenic (vaso-vagal syncope) and in them syncope is generally benign. Paroxysmal tachycardia is an occasional cardiogenic cause of syncope in young persons. Aortic valvular disease is the only form of valvular disease causing syncope. In this case syncope owns a neurogenic mechanism. If, on the other hand, the patient were an elderly man, we would first exclude a cardiogenic origin such as Adams-Stokes' syndrome, certain tachycardias, e.g., fibrillation and flutter, myocardial insult, i.e., coronary thrombosis, and calcific aortic stenosis. We would also remember that cerebral arteriosclerosis might be a factor in the case. And in elderly men with arteriosclerosis or hypertension, we might occasionally diagnose carotid sinus syncope of which there are two



Electrocardiogram of case reported.

types, (1) cardiac or circulatory, and (2) cerebral (Ferris, Capps and Weiss, 1935). In vasovagal syncope, loss of consciousness is secondary to the steep fall of blood pressure, and the vagal slowing of the heart is less important, whereas in the cardiac type of carotid sinus syncope unconsciousness is dependent upon slowing of the heart, which may amount to complete block for a few beats, and the usually accompanying fall of blood pressure is secondary to this slowing of the heart. Sweating aids recognition of the former type of syncope: in cardiac syncope sweating is rare.

The cerebral type of carotid sinus syncope is characterized by the occurrence of syncope and convulsion in spite of the fact that there is no cardiac slowing and no fall in the blood pressure, i.e., in spite of a normal blood flow. Syncope of this type is due to altered reaction of the brain cells, dependent upon vaso-motor changes in strictly localized areas or upon a response to afferent nervous impulses originating in the (hypersensitive) carotid sinuses. Apparently

these were the cases that Gowers relegated to the borderland between epilepsy and syncope: at least so Weiss suggests. Vaso-vagal syncope of Weiss and Ferris has a somewhat similar mechanism to that of the cardiac type of carotid sinus syncope. This very occasional form of syncope is due to reflex slowing of the heart caused by gastro-intestinal disorders acting through the vagus nerves. Night starts and bad dreams are more common in the subjects of aortic than of mitral disease. But a story of night starts and bad dreams is not infrequently told by an emotional and imaginative patient such as this one. Palpitation too is not uncommon in the subjects of aortic disease, but here again the sensitivity of the nervous system greatly conditions its occurrence. The asthenia complained of is unassociated with heart failure or with active valvulitis. The latter would be evidenced by the leucocyte count (best of all), the pulse rate especially the sleeping pulse rate over 90, temperature above 99°F., accelerated sedimentation rate, dyspnæa, præcordial pain, nausea and vomiting, by rheumatic polyarthritis,

twitching, nodules, muscle and joint pains, hemoptysis, diarrhea and petechiæ, progress of valvular lesions, electrocardiographic changes and increasing heart size. We may therefore reasonably conclude that this case is complicated by neurocirculatory asthenia.

The slight pallor of this patient is unattended by appreciable anæmia. Active rheumatism has been excluded. Subacute bacterial endocarditis is negatived by the absence of symptoms and signs of infection including finger clubbing, splenic enlargement and superficial petchiæ. Another possibility is 'pale mitral stenosis', i.e., mitral stenosis

with aortic regurgitation. Neck associated pulsation, however, is absent. But the slow heaving cardiac impulse is a striking sign: in view of the absence of neck pulsation it prompts a diagnosis of aortic stenosis. This diagnosis is confirmed by the presence of the corresponding murmur and thrill, diminished aortic second sound, aortic diastolic murmur, moderately enlarged left ventricle, and by the absence of aortic dilatation radiologically. presence of mitral stenosis further reinforces the diagnosis. The pulse is a compromise between the pulses of all three valvular lesions. A rheumatic ætiology is clearly indicated by the rheumatic history, prominent præcordium, clinically and radiologically evident mitral stenosis, and the electrocardiographic picture. We shall now briefly interpret the latter.

Auricular hypertrophy, the logical consequence of mitral stenosis, is evidenced by the excessive height and width of P. Ventricular preponder ance is lacking in this case of rheumatic aortic stenosis and regurgitation with mitral stenosis,

because the effect of right ventricular hyperpecause associated with mitral stenosis is neutrophy associated with mitral stenosis is neutralized by the effect of hypertrophy of the left ventricle which has resulted from aortic stenosis and regurgitation. The cessation of rheumatic activity is marked by the return of the Q-T interval to normal. The P-R interval, however, remains prolonged. Such persistent prolongation of the P-R interval in a rheumatic subject indicates a distinct proclivity to the development of auricular fibrillation, the onset of which is precipitated by the simultaneous action of two factors, i.e., vagal activity and the E factor of Nahum and Hoff. The QRS and P-wave changes tend to persist and will increase with further recurrence of rheumatic activity and the hypertrophies resulting from the diseased aortic and mitral valves. Permanent electrocardiographic changes in rheumatic heart disease include notching or slurring of the QRS group in two or more leads, T-wave inversion (T, T2) and auricular fibrillation. T-wave changes and factors influencing the pattern of the T-wave in aortic stenosis are already described.

#### Supplementary note

Since the completion of this paper the patient has been readmitted on account of a rheumatic relapse. His aortic stenesis is clear-cut as before. His mitral stenosis is more in evidence than formerly, in that he now displays a diastolic thrill, snappy mitral first sound and a longer mitral diastolic murmur. His pulses have altered somewhat. His present blood pressure is 130/90 right arm and 120/75 left arm. The jugular chain of cervical lymphatic glands is just palpable bilaterally. Graded pressure over his right carotid sinus again failed to elicit evidence of carotid sinus sensitivity, such as may be induced to the point of syncope in a chronic dysenteric in our wards, a Hindu male, aged 60 years, who has never in his life complained of dizziness, giddiness or syncope. The vaso-vagal attacks described by John Ryle (1939) emphasize the great importance of nervous impulses in the production of syncope and serve to remind us that cerebral anoxia is not the only mechanism causing unconsciousness in man.

A few points in the treatment of calcific aortic stenosis in the stage of failure

Bedford (1939) has ably outlined the treatment of isolated left ventricular failure. Mackenzie and Lewis believed that depression of auriculo-ventricular conduction was the essential action of digitalis on the heart. In his treatment of failure with congestion, Lewis said: The most emphatic action of digitalis and its allies is in the case of auricular fibrillation'. Lewis (1937) dismissed digitalis therapy in failure with regular rhythm, with the remark congestion that present regular heart action, and that have been treated by all the usual methods

without success, respond to full doses of digitalis'. Wenckenbach and Christian, on the other hand, attributed the efficiency of digitalis to its effect on myocardial tone and contractility, and on this basis advised its use in all congestive failures. Gavey and John Parkinson assessed the clinical value of digitalis in heart failure with normal sinus rhythm and compared the same with that in auricular fibrillation. Their main conclusions were given in a former paper (Kelly, 1939). The third effect of digitalis on the heart, namely its depression of the pacemaking function of the sino-auricular and also of the auriculo-ventricular node with resulting tendency of the heart rate to be lowered, has long interested John Parkinson. In soldiers with cardiac symptoms and a frequent pulse John Parkinson (1917) found the reduction in rate from digitalis 'was almost negligible' and in his recent study of digitalis in failure with normal rhythm he remarks that 'Reduction in rate was not always accompanied by clinical improvement, though improvement was rather more common in the patients who showed it. Some good clinical results were seen without any reduction in rate'. Hence, in the regular rhythm failure of calcific aortic stenosis, which is generally documented by a remarkably slow heart rate, we must not strive after a further reduction of the heart rate: induction of the muscular effect of digitalis and not of its direct sinus action is the object of therapy.

Partial heart block does not contra-indicate

the use of digitalis.

Convallan is recommended by Ralph Major and Leger (1939) in lieu of digitalis, should heart block or bundle branch block attend cardiac failure, as it not infrequently does in calcareous disease of the aortic valves. Convallan is a special extract of Convallaria majalis or lily-ofthe-valley. Its activity is due to certain digitalis-like glucosides. Its pharmacological action in large doses is essentially the same as that of digitalis and strophanthin. In small doses it produces remarkable diuretic effect without causing heart block or increasing the degree of any existing block. Its cumulative action is negligible and it may be given before or after digitalization with complete safety. The minimum effective dose is 3,000 frog units, and up to 12,000 frog units may be administered daily with safety. We have had no personal experience of convallan yet.

'The partnership of a mercurial diuretic with digitalis should govern the treatment of heart failure'—John Parkinson. The former lessens cedema, even of the heart muscle itself, and the latter directly improves myocardial efficiency. Nearly ten years ago Bedford demonstrated the occasional superiority of salyrgan to digitalis in the treatment of heart failure. Salyrgan acts mainly on the kidneys, either directly or indirectly as part of a general vascular effect: Hermann and others suggest that it acts preponderantly through inhibiting

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Hence reasonably effitubular reabsorption. cient renal function is essential for salyrgan diuresis, and impaired renal function contraindicates the use of salyrgan or other mercurial Obviously, calcific aortic stenosis subjects with sclerotic kidneys are unlikely to respond to salyrgan. Other preparations similar to salyrgan are neptal and mersalyl. Esidrone (Ciba), the sodium salt of pyridine dicarboxyβ-mercuri-w-hydroxy-propyl-amide-theophylline, contains 32.2 per cent mercury in non-ionizable form and 28 per cent of theophylline which is bound chemically to the mercury molecule. Mercupurin is another mercury-theophylline compound. Fishberg (1937) enjoins upon us not to give mercurials to moribund patients: 'I have', he said, 'seen them add the coupe de grace by producing anuria'. Mercurials lower the venous pressure and so are inadvisable in the shock stage of coronary thrombosis.

The action of mercurial diuretics should be supplemented from time to time by xanthine derivatives. Theopyllin (theocin) according to Fishberg produces diuresis predominantly through increase in renal blood flow with consequent augmentation in glomerular filtration. Its chief compounds are theophylline ethylenediamine (aminophyllin or euphyllin) and theobromine sodium-salicylate (diuretin). Theobromine calcium-salicylate (theocalcin) may sometimes usefully replace diuretin. Animal experiments have probably over-emphasized the additive or synergistic effect of calcium and digitalis on the heart. Wall (1939) found that no untoward reactions followed the intravenous injection of 5 c.cm. of a 20 per cent calcium gluconate solution in congestive failure cases receiving digitalis. He suggests that the calcium so injected is diluted before it reaches the heart by the increased circulating blood volume and slowed circulation of heart failure subjects. In Wall's opinion the danger lies in a sudden increase in calcium-ion concentration in the heart and not in the synergism of calcium and digitalis. Finally, we might add that we find some advantage in 'ringing the changes' on diuretic drugs.

#### Summary

1. The modern ætiological concept of calcific aortic stenosis is that the vast majority of cases are clearly rheumatic in origin.

2. The incidence of rheumatic heart disease in our hospital practice was shown and an attempt was made to ascertain the incidence of aortic stenosis from our clinical and post-mortem records.

The distinctive symptomatology of calcific aortic stenosis was described.

The diagnostic criteria of aortic stenosis were discussed in moderate detail.

5. Calcification of the aortic valve demonstrable by fluoroscopy is indisputable evidence of calcific aortic stenosis.

6. The electrocardiographic and other findings were briefly outlined.

7. The essential requirements for a diagnosis of aortic stenosis were stated and the differentiation of calcific aortic stenosis from arteriosclerosis or coronary heart disease mentioned.

8. A reference was made to the prognosis of aortic stenosis.

9. The importance of correlating clinical electrocardiographic and radiological findings in a heart case was stressed.

10. A case of rheumatic aortic stenosis was presented.

11. The treatment of calcific aortic stenosis in the stage of failure was briefly reviewed.

I am grateful to Lieut.-Colonel J. C. De. I.M.S., Superintendent, Medical College Hospitals, Calcutta, for permission to report the case. I acknowledge gratefully the help I received from Dr. A. K. Ahmed, my senior house physician, and from Dr. G. B. Sinha, my medical registrar, in respect of our hospital statistics.

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OBSERVATIONS ON THE USE OF NICO-TINIC ACID IN THE TREATMENT OF PELLAGRA AND ALLIED CONDITIONS

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In September 1937 Elvehjem et al. discovered that a single dose of 30 mg. of Eastman Kodak Company nicotinic acid improved the appetite and stopped the diarrhea in a dog suffering from black tongue; since this date many people have treated human pellagrins with nicotinic acid. Results from this form of treatment have been so successful that nicotinic acid is now established as a specific cure for pellagra.

A large amount of research has been carried out in the United States where pellagra is very common. Smith et al. (1937) reported a cure with 60 mg. of nicotinic acid daily for twelve days. The appetite improved after 24 hours and mental improvement was noted after 48 hours. The skin was improved after 3 days.

Spies et al. (1938) reported an immediate increase in appetite and cessation of nausea and diarrhea. Twenty-four hours after administration of nicotinic acid, the tongue became less

sore and salivation diminished. He recommended a full well-balanced diet in addition to nicotinic acid.

Spies and Aring (1938) drew attention to beriberi symptoms in pellagra cases. They found that many pellagrins in the U.S. A. suffered from alcoholic neuritis.

In India cases of pellagra are frequently met with. Rau and Raman (1936) reported 8 cases in Vizagapatam. They carried out blood analysis and found that the blood showed a fairly constant reduction in the albumin

In March 1939, Napier drew attention to the importance of this disease in India in a detailed description of it, and Sen Gupta, Napier and others (1939) recorded five cases treated in Calcutta. Bajaj (1939) treated one of six cases in the Punjab with nicotinic acid and found it to be 'very helpful in improving the local condition of the mouth and the skin'

A Hindu agriculturist was treated successfully in Midnapore in July 1939 with six injections of nicotinic acid, and further interest in this form of treatment was aroused by two more cases in the Presidency General Hospital. At the same time it was observed that several other patients. particularly Anglo-Indians, showed some of the symptoms of pellagra though not clinically suffering from that disease. Many of this latter group showed improvement under nicotinic-acid treatment.

Altogether 20 cases were treated with nicotinic acid and for study purposes these were divided into three groups.

(1) Cases of true pellagra.

(2) Cases of nicotinic-acid deficiency.

(3) Miscellaneous cases.

#### Cases of true pellagra

Only three cases were allotted to this group. The distinction, however, between this group of cases and those classified under nicotinic-acid deficiency was mainly one of degree. Patients with marked skin lesions, gastro-intestinal and nervous symptoms were classified as true pellagra cases. Less definite cases were classed as cases of nicotinic-acid deficiency. All three were men between the ages of 30 and 50 years. One was a Hindu agriculturalist and the other two were unemployed Anglo-Indians.

Rice was the main article of diet in each case though the Hindu was in the habit of eating fish fairly frequently, and the Anglo-Indians ate

meat when they could afford it.

The duration of symptoms varied from 7 months to 12 years. The most severe was case 1: he complained of indigestion, itchiness, and 'insects flying out of his ears' and 'worms crawling in the skin'. His condition became worse each winter but he had managed to do his work till a year ago when fever and diarrhœa left him very thin, and he had to give up his employment as a boiler-maker. He had previously been treated in hospital for gastritis.

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On admission he was found to be 'slightly mental' and his general appearance suggested it (see photo). He was very thin and covered with a pigmented coarse skin which was most marked on the front of his chest, on the face and on the outer aspects of his arms and legs. He had fever and diarrhea and his knee jerks were markedly exaggerated. He had a very moist tongue with red edges and a pronounced tremor.

He received six daily intramuscular injections of 2 c.cm. nicotinic acid. His appetite improved, he became more alert and his skin began to peel off. After six days' interval he received 2 c.cm. (50 mg.) intravenously followed by daily intravenous injections of 3 c.cm. (75 mg.) of nicotinic acid. This caused his skin to go pink

Pellagra.

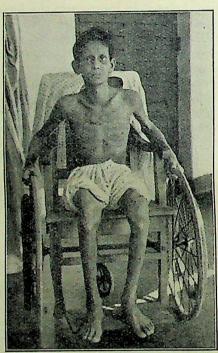


Fig. 1. Case 1.—A photograph taken about 10 days after admission. The distribution of the skin lesions can be seen. A certain amount of leucoderma is present on the hands.

in the less affected areas and hastened the peeling process. He complained of a burning sensation all over his body. His bowels moved less frequently, his weight began to increase, and he had no more fever. He now received three tablets (150 mg.) three times a day for a month, when the dose was reduced to two tablets thrice daily. He received a total dose of 16,975 mg. of nicotinic acid.

His condition on discharge was very good. He gained 13 lbs. 4 oz. in weight, his appetite was good and his tongue was no longer sore. His skin was practically normal, but when the coarse skin peeled off it left paler skin underneath. His mental state showed a marked improvement and he felt well enough to regain his employment as a boiler-maker.

The two other cases of pellagra were less severe. The Hindu (case 3) improved greatly after 6 intravenous injections of 50 mg. each. The most striking change was in his demeanour. He was a morose silent man on admission but after treatment he became brighter and more inclined to talk. His skin began to peel off but he left before complete cure was obtained.

The third patient in this group (case 2) suffered principally from diarrhœa and emaciation. His skin was not so coarse and pigmented as that of the other two. He had a very sore tongue and achlorhydria.

He was treated for more than 2 months as a case of chronic bacillary dysentery, but showed no improvement until nicotinic acid was administered. This had an almost immediate effect on

Pellagra.



Fig. 2.—The same case after treatment with nicotinic acid. Note the increase in weight and appearance of the face. The coarse scaly skin has fallen off and lighter coloured skin is left behind.

the diarrhea which stopped after five days. He received a total of 2,800 mg. of nicotinic acid.

Nicotinic-acid deficiency.—Twelve cases were considered to be suffering from deficiency of nicotinic acid. Seven of these were children and the other five adults. Four were females are eight males. They all belonged to the poorer classes and lived mainly on rice and dâl. Four of them complained of a sore tongue and boy of 13 (case 9) had a swollen tongue ulceration round the edges and on the surrounding mucous membrane of the mouth. He proved rapidly under nicotinic-acid treatment.

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Gastro-intestinal symptoms were present in seven cases and consisted mainly of slight diarrhea. In two cases, however, diarrhea was severe and at times was accompanied by

All except one case showed some change in the vomiting. condition of the skin. In some there was a dryness and scaliness with a certain amount of itching. In others the skin was thickened, pigmented and coarse, the distribution of the pigmentation being symmetrical and usually on the forehead, outer aspects of the arms and legs, and on the chest and neck. Almost invariably the patients attributed these changes to the cold weather and asserted that in the summer their skins became perfectly normal until the next winter.

Symptoms of nervous involvement were often present. In seven cases the knee jerks were exaggerated, in two cases diminished, and in two cases absent. One patient had previously suffered from 'beri-beri' and one Chinese boy had had beri-beri symptoms. He left hospital before

Nicotinic-acid deficiency.



Fig. 3. Case 4.—The photograph shows the slight pigmentation and rough skin which is often present in cases of nicotinic-acid deficiency.

completing his treatment. One African negro (case 13) suffered from peripheral neuritis due to alcoholic excess, and had no knee or ankle jerks. A marked tremor of the tongue was noticed in two cases only. The majority of cases were rather della the control of the tongue was noticed in two cases only. were rather dull and apathetic, especially the

Fever was present in nearly all cases at some stage of their illness and nearly all cases had lost weight.

Laboratory investigations

The cerebro-spinal fluid was examined in five cases. Apart from a reduction in the number of cells present and in the protein in some cases, there was no constant abnormality.

On examination of the urine, porphyrin was found in four cases. Hypochlorhydria was an almost constant feature.

The blood was examined in some detail. In only two cases did the red cells reach the level of 4,000,000 per c.mm. The hæmoglobin remained in most cases between 50 per cent and 60 per cent with a colour index in the region

The Wassermann and van den Bergh tests were always negative.

The blood calcium was slightly reduced in several cases, but the serum albumin and globulin were unaltered.

### Treatment

Nicotinic acid was given to all cases in varying dosage according to the severity of the case. A usual dose was 6 intravenous injections of 2 c.cm. (50 mg.) of nicotinic acid (Glaxo), followed by nicotinic-acid tablets (50 mg. each) two or three times daily.

In severe cases 4 c.cm. (100 mg.) was given daily intravenously for six to ten days, followed by three tablets (150 mg.) three times a day for 3 weeks.

As hypochromic anæmia was a feature of every case treatment was supplemented with ferrous sulphate gr. iii thrice daily, or 'polyhæmen' tablets six daily. Small doses of thyroid were given in some cases, and all received a mixed well-balanced diet.

As a result of this treatment practically all cases complained of burning and itching in the skin which quickly passed off. In most cases the appetite improved after one or two injections, and there was a marked improvement in their mental attitude. They became brighter and more lively. This was particularly noticeable with children who responded rapidly. Several children became very flushed and almost pink, but this wore off soon and did not appear to worry them. The pulse and temperature remained normal.

Four or five injections were required before any effect was noticed in diarrhea cases, and the skin lesions were the last to disappear, though scaling commenced early on in treatment. The average gain in weight was 4 pounds during treatment.

### Miscellaneous cases

Nicotinic acid was administered to five cases suffering from various conditions other than pellagra. One was a Jewess who ate a good mixed diet, including meat and fruit, as well as rice and dal.

She suffered from scabies with secondary infection which gave rise to an extremely offensive odour due to the pus which oozed from the numerous sores on her fingers, hands and toes. She had suffered from this condition off and on for one year. She received 12 intravenous injections of nicotinic acid (600 mg.) and 4,700 mg. by mouth. The skin of her fingers peeled off

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Case number	Sex	Age, years	Nation- ality	Diet	Dura- tion, years	Gastro- intestinal symptoms	Skin lesions	Nervous symptoms	Seasonal exacerba- tion	Blood counts
I	М.	30	AI.	Rice, dål.	12	Sore tongue, salivation, vomiting, diarrhœa.	Face, chest, abdomen, shoulders, arms, thighs, legs, dorsum of feet.	Hallucinations, tremor of tongue, plus knee jerks, ankle clonus, diplopia.	Winter	R. B. C. 2,230,000, W. B. C. 8,000, Hb. 38%.
П	М.	44	AI.	Rice, dâl.	7/12	Sore tongue, salivation, diarrhœa.	Legs, knees, arms, forehead.	Dull, apathetic, absent knee jerks.		R. B. C. 3,390,000, Hb. 60%.
Ш	M.	50	Н.	Rice, fish.	3	Sore tongue, diarrhœa.	Neck, forehead, arms, legs.	Headache, morose, dull, plus knee jerks.	Winter	
IV	F.	9	AI.	Rice, dâl.	6	Salivation, vomiting, diarrhœa.	Legs, arms, forehead.	Tremor of tongue, plus knee jerks.	Winter	R. B. C. 3,640,000, W. B. C. 10,200, Hb. 60%.
v	F.	5	AI.	Rice, dâl.	2	Vomiting, diarrhœa.	Forehead, arms, legs, back.	Listless, plus knee jerks.	Winter	R. B. C. 3,280,000, W. B. C. 4,250, Hb. 55%.
VI	F.	29	AI., sister of No. I.	Rice, d <b>â</b> l.	3	Sore tongue, salivation.	Forearms, legs, thighs.	Headache, sleeplessness, plus knee jerks, ankle clonus.	Winter	R. B. C. 3,640,000, W. B. C. 6,750, Hb. 55%.
VII	М.	11	AI.	Rice, dâl, meat.	1	Salivation, vomiting.	Forehead, arms, legs, dorsum of feet.	Knee jerks diminished.		R. B. C. 3,240,000, W. B. C. 5,600, Hb. 55%.
VIII	M.	55	AI.	Rice, dâl, tapioca, sago.	12	Sore tongue, salivation, vomiting, diarrhœa.	Arms, legs, thighs, dorsum of feet.	Apathetic, knee jerks absent, cramps.	Winter	R. B. C. 3,200,000, W. B. C. 9,750, Hb. 60%.
IX	M.	13	AI.	Rice, dâl, bread.	3	Sore tongue, salivation, diarrhœa.	Arms, legs, ankles.	Dull, tremor of tongue, plus knee jerks, ankle clonus.	Winter	R. B. C. 3,540,000, W. B. C. 7,250, Hb. 60%.
x	М.	12	Chinese	Rice	1,2		Dry skin, leg pig- mented slightly.	Knee jerks absent.		R. B. C. 3,510,000, W. B. C. 4,500, Hb. 65%.
XI	F.	13	AI.	Rice dâl, arrow-	1 <sup>2</sup> 2	Diarrhœa	Skin slightly dry.	Listless, apathetic, plus knee jerks.	••	R. B. C. 3,640,000, W. B. C. 12,780, Hb. 60%.
XII	M.	1	AI.	root.	72	••	Arms, legs, face.	Irritable, restless, plus knee jerks, ankle clonus.	••	R. B. C. 3,260,000, W. B. C. 10,750, Hb. 55%.
XIII	M.	43	African negro.	Fish, rice, dâl,	5	••	Legs, arms, chest.	Absent, knee jerks.	Winter	W.B.C. 11,500
XIV	M.	39	AI.	meat. Rice, dâl.	5	Sore tongue, salivation, diarrhœa.	Dry skin, arms and legs scaly.	Sleeplessness, plus knee jerks.	••	R. B. C. 3,260,000, W. B. C. 7,250, Hb. 60%.
xv	M.	59	AI.	Rice, dâl.	1/12	Diarrhœa	Dry skin	Dull, apathetic, sleeplessness.	••	

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Cerebro-spinal fluid	Porphy- rin	Fasting juice	Blood chemistry, per cent	Increase in weight, lb.	Concomitant disease	Treatment, nicotinic acid	RESULT
No increase in pressure, no cells, total protein 26 mgm., glucose 58 mgm.	_	Free acid 0.07, total acid 0.13.	C. 10.05 mg., P. 6.10 mg., Alb. 3.85 g., Glob. 3.39 g.	131		275 mg. IV, 600 mg. IM, 16,100 mg. oral, total 16,975 mg.	Cured.
No increase in pressure, no cells, total protein for mg. %, glucose 55 mg. %.	+	No acid	C. 9.33 mg.	10		1,600 mg. IV, 1,200 mg. oral, total 2,800 mg.	Cured.
••						300 mg. IV	Improved
No increase in pressure, few R. B. C.			C. 8.96 mg., P. 4.76 mg., Alb. 3.9 g.,	41	Malaria (M. T.).	525 mg. IV	Cured.
No increase in pressure, no cells, total protein 24 mg. %.	••		Glob. 3.16 g. C. 8.85 mg., P. 4.9 mg.	43	Kala-azar	150 mg. IV	Cured.
No increase in pressure, no cells, cotal protein 17 mg. %, glucose 55 mg. %.	_	Trace of acid	••			500 mg. IV	Cured.
No increase in pressure, no cells.	+	Free acid 0.07, total acid 0.12.	C. 8.29 mg., P. 5.0 mg., Alb. 3.84 g., Glob. 3.0 g.	2	Malaria (M.T.).	300 mg. IV .	Cured.
	-	Free acid 0.01, total acid 0.03.	C. 9.26 mg., P. 6.07 mg., Alb. 4.06 g., Glob. 3.0 g.	11	Prostatic hypertrophy.	900 mg. IV	Improved
No increase in Dressure, R. B. C., W. B. C.: total Drotein 20 mg., glucose 50 mg.	+	Free acid 0.19, total acid 0.25.	Alb. 3.92 g., Glob. 3.16 g.	7½		600 mg. IV, 3,300 mg. oral, total 3,900 mg.	Cured.
		Free acid 0.07, total acid 0.09.	C. 8.95 mg., P. 4.0 mg., Alb. 4.09 g., Glob. 3.00 g.		Beri-beri	300 mg. IV	Left befor treatment completed
			Alb. 3.96 g., Glob. 2.87 g.	1		150 mg. IV, 1,650 mg. oral, total 1,800 mg.	Cured
				1		150 mg. IV, 250 mg. oral, total 400 mg.	Improved
	-	No acid	C. 8.35 mg., P. 6.18 mg., Alb. 4.3 g.,			350 mg. IV	Cured.
1.	+	••	Glob. 3.16 g. C. 10.26 mg., P. 5.7 mg., Alb. 4.3 g.,	7	••	300 mg. IV, 6,300 mg. oral, total 6,600 mg.	Improved
		••	Glob. 3.15 g.	2		300 mg. IV	Improved

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Case number	Sex	Age, years	Nation- ality	Diet	Dura- tion, years	Gastro- intestinal symptoms	Skin lesions	Nervous symptoms	Seasonal exacerba- tion	Blood counts	
XVI	F.	25	Jewess	Rice, dâl.	1	Vomiting	Hands, feet.	Dull, apathetic, headache, sleeplessness, plus knee jerks, ankle clonus.	Winter	R. B. C. 3,280,000, W. B. C. 10,250, Hb. 55%.	
XVII	М.	52	A,-I.	Meat, fruit, rice, eggs.	3/365	Diarrhœa	Dry skin	Dull, apathetic.		R. B. C. 4,020,000, W. B. C. 10,750, Hb. 70%.	
XVIII	М.	2	H.	Rice, dâl.	1/12		Buttock, chest, limbs.	Irritable, reflexes normal.		R. B. C. 3,860,000, W. B. C. 8,750, Hb. 65%.	
XIX	F.	26	AI.	Rice, dâl, fish.	<b>1</b> 2	••	Erythema and blisters all over.	Simple hysterical, reflexes normal.		R. B. C. 4,020,000, W. B. C. 7,750, Hb. 70%.	
XX	F.	3	AI.	Rice, dâl.	1 <sup>2</sup> / <sub>2</sub>	•••	Dry skin	Listless, reflexes normal.		R. B. C. 3,280,000, W. B. C. 14,250, Hb. 60%.	

H. = Hindu.

A.-I. = Anglo-Indian.

like a glove and left a healthy skin underneath. The same process occurred with her toes but some of the sores on her hands required touching with iodine to keep them from reinfecting the whole skin.

The remaining cases were two children of which one was a Bengalee, one Anglo-Indian male of 52 years, and one female of 26 years. The Bengalee child had an ulcer on his buttock and scabies with secondary infection. It improved temporarily on receiving nicotinic acid but relapsed and was removed by its father as he was going on leave. The other child had a dry skin and was dull and apathetic. Her general condition improved with nicotinic acid, and she became brighter and more interested in her surroundings. The Anglo-Indian male suffered from a septic scrotum and scabies. He had no appetite and was very apathetic. His appetite improved with nicotinic acid and he became more alert. The adult female suffered from rheum-atism. She showed no improvement under nicotinic-acid treatment.

### Summary and conclusions

- 1. A description is given of 20 cases treated with nicotinic acid. The successful treatment of three cases of pellagra is described.
- It is suggested that, though pellagra is quite a common disease in Bengal, there are a much larger group of cases, especially amongst Anglo-Indians, showing such symptoms as sore tongue, anorexia, stomatitis, diarrhœa,

mental dullness, which respond well to treatment with nicotinic acid. These are classified as cases of nicotinic-acid deficiency for the purposes of this study.

3. It is suggested that certain skin conditions such as infected scabies show improvement with nicotinic-acid treatment which increases the blood supply of the affected area.

4. Treatment with nicotinic acid consisted generally in a course of six intravenous injections of 2 c.cm. followed by two tablets thrice daily. This treatment was combined with the administration of ferrous sulphate and a mixed well-balanced diet.

5. Hypochlorhydria and a hypochromic anæmia were invariable accompaniments. In some cases a reduction in the albumin content of the cerebro-spinal fluid was noted.

Acknowledgments.—I wish to thank Major J. C. Drummond, I.M.S., Superintendent, Presidency General Hospital, for permission to publish this article, also Mr. S. N. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. When and D. S. W. Paul, Dr. G. P. W. Paul, Dr. G. P. W. P. W. Paul, Dr. G. P. W. P. Khan and Dr. P. N. Ghosh for the laboratory work.

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Cerebro-spinal fluid	Porphy- rin	Fasting juice	Blood chemistry, per cent	Increase in weight, lb.	Concomitant disease	Treatment, nicotinic acid	RESULT
	Trace		C. 10.0 mg., P. 5.7 mg., Alb. 4.09 g., Glob. 3.0 g.	2	Dermatitis	600 mg. IV, 4,700 mg. oral, total 5,300 mg.	Cured.
	-	Free acid 0.09, total acid 0.13.	Alb. 4.12 g., Glob. 3.0 g.		Ulcerated scrotum.	300 mg. IV	Cured.
				1	Infected scabies.	3,000 mg. oral	Improved.
	_	Trace of acid	C. 8.9 mg., P. 4.0 mg., Alb. 4.19 g.,	1	Rheumatism	300 mg. IV, 1,200 mg. oral, total 1,500 mg.	No improve- ment.
	-		Glob. 3.0 g. Alb. 3.96 g., Glob. 3.0 g.	••	Otitis media	150 mg. IV, 1,200 mg. oral, total 1,350 mg.	Improved.

C. = Calcium.

P. = Phosphorus.

IV = Intravenous.

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## EXPERIENCE WITH DISEASES OF THE GALL-BLADDER

By V. M. KAIKINI, B.A., F.R.C.S. (Edin.) King Edward Memorial Hospital, Bombay

For a long time it has been the general belief that diseases of the gall-bladder are of rare occurrence, are of a serious nature, occur only in elderly women, and are always associated with stones. The obsolete adage fair, fat, forty and fertile 'is still committed to memory and quoted by medical students, and even by some medical men. However, by ex-Perience one finds that lesions of the gall-bladder are as common as, or perhaps more common than less than the common as th than, lesions of the duodenum and the appendix, but, as the lesions of the two latter organs produce more acute symptoms for which the patient seeks the doctor's advice, they are noticed more by the surgeon and thought of primarily. In a good many cases symptoms due to gall-bladder disease are attributed not only to other abdominal viscera, such as the duodenum, appendix and kidney, but to extra-abdominal organs as well, especially the heart.

Etiology and pathology of cholecustitis. Pathological conditions of the gall-bladder that have any surgical significance are intramural. and the avenues of infection are mainly through the vascular and lymphatic systems, though rarely an ascending infection through the duodenum and the bile ducts is possible. Streptococci, staphylococci, B. coli, and B. typhosus have been found in cultures made from the bile in cholecystitis. Experimentally it has been found that when streptococci are injected into the bile, no change results. But when streptococci are injected intramurally into the gallbladder a typical cholecystitis develops within a couple of months. In a good many cases the primary infection is in the gastro-intestinal canal, especially in the appendix or the gastroduodenal area, and the gall-bladder is secondarily affected. The organ may also be affected from the liver by direct contact, in those cases where the liver cells are damaged by continued infection carried to it through the portal

The nervous system may also be responsible for the damage to the gall-bladder by the disturbance in the function of the vagus nerve. This may be due to the stimulus which reaches the vagus in its peripheral portion, its centre in the medulla, the mid-brain, and also the interbrain. The irritation to the vagus may be caused by extrinsic poisons such as nicotine, intrinsic poisons such as a chronically inflamed appendix, or the vegetative impulses which are easily affected by psychological influences in people with a neurotic temperament. According

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to Westphal, hypersensitivity of the vagus, with consecutive incoordination between the vagus and the sympathetic, causes over-rapid emptying of the gall-bladder, spasm of the ampulla of Vater, and complete cessation of the bile flow. Westphal describes another type of nervous disturbance giving rise to pathological conditions of the gall-bladder. In this condition the vagus nerve is under-sensitive, and the sympathetic predominates, thus creating atony of the gallbladder and ampulla, with spasm of the sphincter of Oddy. He designates these conditions under the common name 'biliary dyskinesia'. However, the main factor in this condition is the disturbance in the coordination between the vagus and the sympathetic nerves.

According to Wolfer, with a low-grade stasis in biliary passages such as may be produced by disturbed papillary function or by complete or incomplete obstruction at the duodenal end of the biliary and pancreatic ducts, the bile mixed with pancreatic juice may remain in the ducts for a considerable time, the bile-pancreatic-juice ratio may be altered, and variable amounts of pancreatic juice may enter the gall-bladder. If the pancreatic content be higher, it may give rise to pathological changes in the bile ducts

and the gall-bladder.

Out of about 106 cases that came with symptoms of gall-bladder trouble about 25 per cent gave a history of having suffered from an attack of typhoid fever, about 10 per cent gave a history of dysentery, about 15 per cent gave a history of irregularity in meals, about 10 per cent were alcoholics, and, in about 5 per cent of cases, associated disease of the appendix or a peptic ulcer was found. In other cases, no definite atiological factor could be detected, except some irregularities in the mode of life.

### Clinical features

About 20 patients were admitted for acute cholecystitis, and they came with all the symptoms of acute abdomen. The symptoms were those of acute appendicitis, but subjective and objective symptoms were much less severe than in appendicitis; especially was shock much less marked. All these cases recovered from the acute attack, and only seven consented to operation. One patient who was not operated upon, had three more attacks of acute cholecystitis with jaundice, developed a cirrhotic condition of the liver, and died of phthisis after 10 years. The other patients who refused operation could not be traced.

In all these acute cases, pain was the most marked clinical symptom, present all over the abdomen but most marked on the right side. Radiation was toward the chest, sub-costal region and the angle of the scapula. Vomiting was not a marked symptom. The shock was less severe, the symptoms subsided more quickly than in acute appendicitis, and the pain and tenderness became localized to the right hypochondrium.

In chronic cases pain was rarely severe. It was usually of a dull character, and appeared soon after food, was relieved by vomiting, or after the stomach was empty. In advanced cases it was continuous. It was most marked in the right hypochondrium and radiated to the epigastrium, right sub-costal region, or the angle of the right scapula. Nearly every patient complained of heaviness and distension of the stomach after meals. Only one patient who had stones in the gall-bladder gave a history of hunger-pain with clockwork-like regularity of duodenal ulcer, Pain in the right shoulder was rarely complained of, and was never found to be a characteristic symptom. History of previous jaundice was given by very few patients.

Westphal's syndrome has been found very valuable in diagnosing a case of cholecystitis from that of the diseases of any other organ in the abdominal cavity. The examining surgeon should place the thumb of his left hand between the sterno-cleido-mastoid and the scalenus anticus muscles on the patient's right and press it toward the larynx and the vertebral column, with his forefingers resting on the back of the neck. If the result is positive, the patient complains of acute pain which may radiate downward. Individual patients feel the same pain if they spontaneously turn their head quickly. For the sake of comparison the same test should be made on the left side also. The phenomenon should be regarded positive if it is markedly stronger on the right side. The phrenic includes sensory branches which run from Glisson's capsule and the bile passages to the coliac and phrenic ganglia. It is therefore a case of viscero-sensory pain reflex resulting from a tension of Glisson's capsule. The test is conclusive only if it is positive and diseases of the diaphragm and thoracic cavity can be excluded. Absence of the phenomenon proves nothing.

Acute pain due to biliary colic is many a time mistaken for angina pectoris. However it has been found that in many cases abnormal changes in the coronary vessels of the heart are due to infection in the gall-bladder. Disease of the gall-bladder is found in 24 per cent of cases of coronary sclerosis. Roberts drew the following conclusion:—(1) Patients with disease of the gall-bladder may present symptoms of early heart failure, or angina pectoris, or both. (2) In middle or old age, heart failure or angina pec toris may be produced by diseases of the gallbladder. (3) In both conditions, disease of the gall-bladder may be the cause, but the signs and symptoms may appear to be of cardio-vascular origin. (4) Cholecystography may be an important diagnostic aid in cases of heart disease. (5) Surgery may therefore be helpful in the treatment of certain cardio-vascular conditions.

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### Gall-stones

Stones were found only in nine cases out of the 65 that were operated on, and in four cases among those that refused operative treatment. The majority of the stones found at operation were of the bilirubin-calcium variety, small and crenated. In two cases the bile presented a gritty feel characteristic of thick sand. In one case, the single stone that was found was big, irregular in shape, dark brown in colour, and hard, of the cholesterol-bile pigment variety. In two other cases the stones were of the same type multiple, faceted, and fairly large. In all these cases the gall-bladder was pathological, and the history of gall-bladder trouble was a fairly long one. Jaundice was present in only two of these cases, and also pain of a persistent nature. In other cases there was no special symptom to indicate the presence of gall-stones. In every case of stones the gall-bladder was found to be pathological. However, the incidence of gall-stones seems to be small in India, as compared to the western countries, although pathological conditions of the gall-bladder are extremely common. Perhaps this may be explained by Crile's theory of the energy background of the genesis of gall-stones! According to him 'gall-stones are less common among lower races of man, and among civilized races with negative philosophy—Hindus and Chinese'.

Carcinoma was found in only two cases. In one of these which was operated on, the gallbladder was slightly enlarged and adherent to the stomach, giving rise to symptoms of pyloric obstruction. The other patient was severely jaundiced and in a condition not fit for

operation.

### Treatment

Out of the 106 cases that came for treatment, 65 were operated upon. In no case was the operation done in the acute stage. Expectant treatment caused the acute symptoms to subside in every case. In all the cases glucose by mouth and intravenously was given liberally, before the operation. Patients with jaundice were found to improve remarkably by 'eating' sugar-cane, chewing the sugar-cane and drinking the juice. For severe pain morphine was found to be of temporary benefit. In a few cases glyceryl trinitrite was tried, but it did not give the expected relief. In three cases a homeopathic drug (sold as 107-1; biliary colic), containing cholesterine 1/100 gr., calcarea renal phosh. 1/100 gr., lithia benzoas 1/10 gr., and dioning 1/100 dionine 1/100 gr., was tried and it gave complete relief from pain and the jaundice was found to disappear disappear gradually. After the acute attack subsided, a mixture containing ol. teribenthinæ 5 min., sod. sulpho-carbolas 10 gr., and tinet. card. co. half a drachm was given. In some cases dilute hydrochloric acid was found to be very useful. Operation was done after all the acute symptoms had completely disappeared. In about six cases with typical severe biliary colic, a drug sold by the American Ferment Company, as 'caroid' pills, containing bile salts, bile acids and papain, gave remarkable relief. In these cases pain was the most marked symptom. Gastric distension, local tenderness in the gall-bladder area, and other symptoms of inflamed gall-bladder were not prominent. Most probably in these cases vagotonia was the predominant factor, and they came under the category of biliary dyskinesia described by Westphal.

Out of the 86 chronic cases, 58 were operated on. The indications for operation were continuous or persistent intermittent pain and gastrointestinal symptoms of distension and dyspepsia. Cholecystography was not always helpful, as many a time a gall-bladder that was found pathological at the operation did not show any abnormality on the radiogram. In the majority of cases, the gall-bladder was found to be involved in adhesions to the surrounding structures, its outer coat was covered with a thick layer of fat, and the colour changed from the normal slate blue to pale yellow or reddish brown. The size of the gall-bladder varied. In the majority of the cases it was found to be slightly enlarged. But when stones were present it was usually smaller than normal, and its wall was thickened. The glands at the cystic duct were invariably found to be enlarged-' Lund's

sentinel glands'. Cholecystectomy was done in all these cases, except one in which cholecystostomy was done. A rubber drainage tube was not inserted in the wound before closing the abdomen in the first nine cases, and wound suppuration was found to be common. In all the other cases a drainage tube was inserted and suppuration of the wound was practically nil. The drainage tube was kept

in for about eight days.

Post-operative history.—The history of the majority of the cases could not be followed beyond two months after the operation. In nearly every case post-cholecystectomy pain was present for about a month or two after the operation. The pain usually disappeared with an alkaline mixture containing tincture of belladonna. In one patient the pain was complained of for about one year. After that it completely disappeared. In two cases no improvement was reported. In one case the post-opera-tive pain was found to be due to a very long retro-cæcal and retro-colic adherent appendix, which was missed at the first operation.

Mortality.-Out of the 65 cases that were operated on the total mortality was five. One died of tetanus, on the tenth day after the operation. The patient was feeling perfectly well till the ninth day, when he developed tetanus and died on the tenth day. The second death

occurred in a patient who came with severe jaundice and severe pain. The operation was done after the jaundice had disappeared. The gall-bladder was found to be very much enlarged and the liver contained multiple abscesses. Death occurred on the third day after the operation. The third death was in a female patient who started to sink after cholecystectomy, and died on the eighth day, most probably a case of 'liver death'. The fourth occurred in a young man who started persistent bilious vomiting on the third day after the operation and died on the eighth day. Unfortunately, gastric lavage was not done in his case, which perhaps might have saved him. The fifth death was in an alcoholic, in whom a slightly enlarged gall-bladder with nine fairly big faceted stones was removed. He developed persistent hiccough and gradually collapsed on the ninth day (vide figure 3).

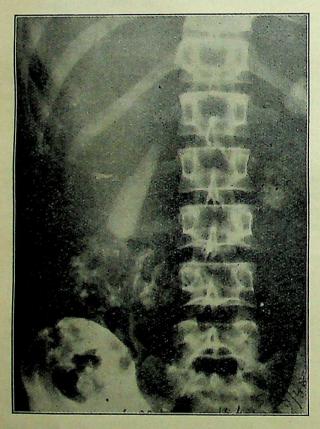


Fig. 1.—Skiagram showing ptosis and elongation of the gall-bladder.

### Presentation of cases

Case 1.—S. N., male, aged 30. Admitted on 31st December, 1935, for severe pain in the epigastrium, of about six days' duration. Tenderness was present in the right hypochondrium and slight icteroid tinge of the conjunctiva. Patient was extremely debilitated. He was seen first by me in June 1925 for a very severe colicky attack. At that time he was very restless shouting and pressing with his hand on the abdomen and the heart area, and saying that pain was shooting towards the heart. From the way on which he was rolling about and bending down I suspected a colic attack, and from the tenderness in the right hypochondrium with the direction of the radiation of the pain, to the back and the chest, I suspected biliary colic and treated him accordingly. He was reported to be

better, although the pain with radiation to the heart area did not completely disappear. So he consulted a physician who told him that the pain was due to a weak heart, and advised him to take eggs and other nourishing food which made the pain worse. Then he got himself admitted into another hospital and was treated as a kidney case; but as nothing was found in the kidney he was discharged.

On admission, his gall-bladder area was found to be very tender and he showed all the symptoms of acute cholecystitis. He was given an expectant line of treatment, and blood was transfused as his general condition was very low. Cholecystectomy was done after about three weeks. The gall-bladder was found to be pale red in colour, slightly elongated, and covered with fibrous adhesions. The convalescence was rather stormy, and he had severe bilious vomiting with hiccough. Gastric lavage gave complete relief, and the icteric tinge of the conjunctive completely disappeared. The course was smooth afterwards. He was discharged on the twelfth day as he felt perfectly well. After about three weeks he returned complaining of severe pain in the epigastrium. For this he was given a mixture containing alkalies and tincture of belladonna. This completely relieved him and since then he has been keeping perfect health, is married, and earning his livelihood as a clerk in a local bank (vide figure 1).

In this case gall-bladder pain had been diagnosed and treated as cardiac and kidney pain for nearly ten years. Post-cholecystectomy pain was relieved by an alkaline mixture containing belladonna.

Case 2.—Female, aged 25. Admitted on 26th April, 1932, for pain in the gall-bladder area radiating to the back in the interscapular region, for about two years. She had been diagnosed as a case of appendicitis. Radiogram did not show any abnormality of the gall-bladder. On opening the abdomen, the gall-bladder was found to be slightly enlarged, reddish in colour, and covered with adhesions. The cystic duct was embedded in a thick layer of fat. On the fundus of the gall-bladder there was a hard nodular growth of the size of a small pea. The gall-bladder was removed and the patient felt free from pain for about three months. Then she used to complain of pain off and on for about a year. After that the pain completely disappeared. She was in perfect health when seen in 1938.

In this case the gall-bladder was full of adhesions and a small nodular growth was present on the fundus. Cholecystography did not show any pathological condition of the gall-bladder. Post-cholecystectomy pain was present for about one year after which it completely disappeared (vide figure 2).

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Case 3.—Male, aged 31. Admitted in December 1936 for acute abdominal pain of ten days' duration. Had similar attack of pain starting suddenly one year ago. After that it recurred four or five times. Tenderness in the gall-bladder region with slight jaundice. Do opening the abdomen the gall-bladder was found to very much contracted, pale grey in colour, and covered with adhesions. The cystic artery was first ligated. The serous coat was firmly adherent to the viscus, and could not be separated. While isolating cystic duct, a thick blood vessel—most probably alongside the cystic duct, toward the fundus of the alongside the cystic duct, toward the fundus of the cystic duct, and the gall-bladder was detached the liver bed. The fundus was firmly adherent to the liver and had to be removed piece-meal. At this point to be embedded in the wall of the gall-bladder, dippassing on to the right lobe of the liver. According passing on to the right lobe of the liver. According passing on to the right lobe of the liver. According passing on to the right lobe of the liver. According passing on to the right lobe of the liver. According passing on to the right lobe of the liver. According passing on to the right lobe of the liver.

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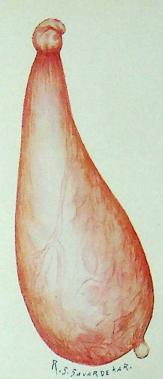


Fig. 2.—Gall-bladder slightly enlarged and having a small papillomatous growth at the fundus.

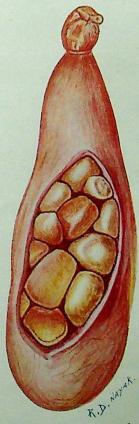


Fig. 3.—Gall-bladder is enlarged and contains numerous faceted calculi.

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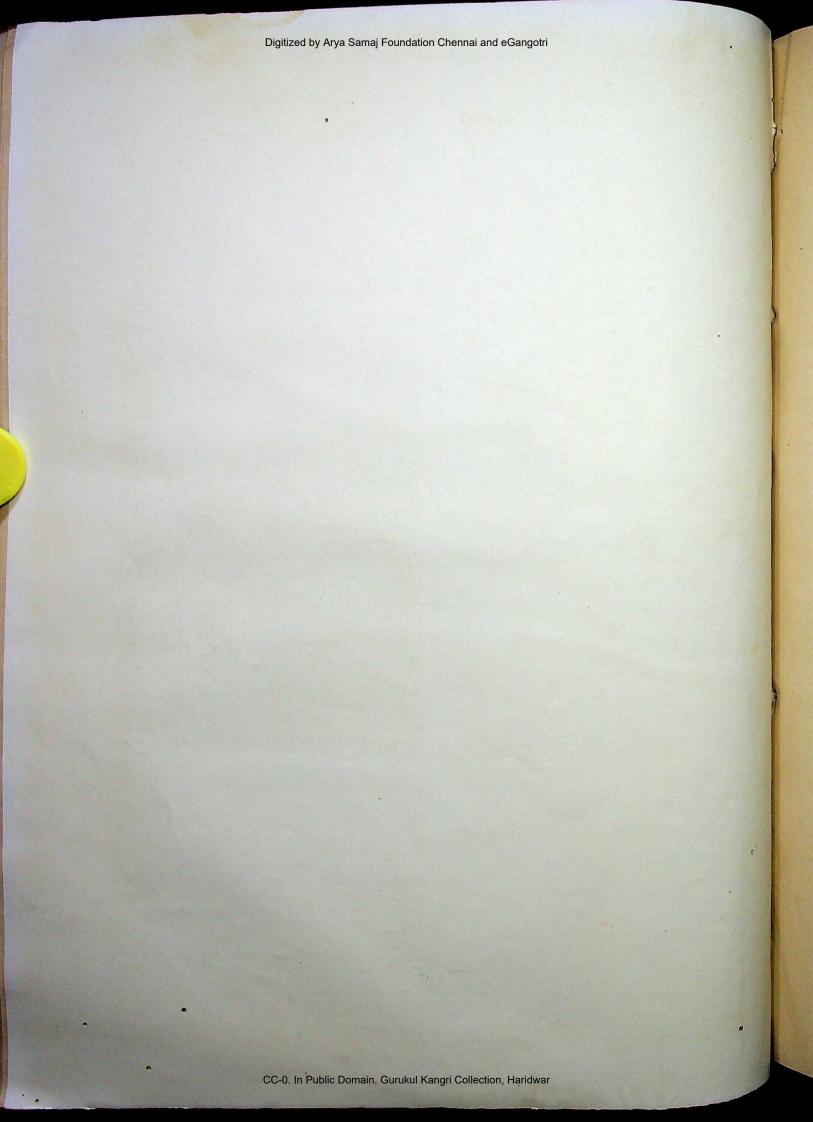
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behind it, at the neck of the gall-bladder. But if the right hepatic artery had been ligated, it would have right nise to some severe complications due to deprivation of the blood supply to the right lobe of the liver. But in this case no post-operative complications occurred, and the convalescence was smooth. The patient was discharged in good condition, and was found to be in sound health some months later.

In this case the aberrant blood vessel passing through the wall of the gall-bladder might have caused the pathological condition of the gall-bladder (vide figure 4).

Case 4.—Male, aged 24. Admitted in January 1937 for severe pain in the epigastrium and vomiting, which according to the patient contained blood. About eighteen months before he got severe abdominal pain with hæmatemesis, and had the operation of gastro-jejunostomy done on him in another hospital, as a case of duodenal ulcer. He felt perfectly well for about six months. But after that severe abdominal pain and vomiting reappeared. He was a heavy smoker and used to take alcohol frequently. He was suspected to have

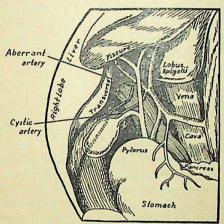


Fig. 4.—Gall-bladder, atrophied, thickened, and changed in colour The aberrant artery is shown as a branch of the right hepatic artery, going through the wall of the gall-bladder, and entering the right lobe of the liver.

developed a jejunal ulcer. But on clinical and radiological examination, jejunal ulcer was excluded. Cholecystography showed non-filling of the gall-bladder. The gall-bladder area was very tender, especially during the presence of the pain. A very significant thing that was noticed was that Westphal's syndrome was well marked when symptoms of pain and tenderness were present, and noticeably absent during the quiescent

On opening the abdomen the gall-bladder was found to be much enlarged, and involved in adhesions. The colour was normal and Lund's sentinel gland could not be detected. The cystic duct was very much narrowed, elongated, and surrounded by thick fibrous adhesions. The gall-bladder was removed. Convalescence was smooth and the patient was discharged free from all symptoms. Since then he has been keeping good health.

In this case the symptoms were most probably due to fibrous contraction of the cystic duct, giving rise to spasm of the gall-bladder. The presence of Westphal's syndrome during the pain and its absence otherwise is rather significant. According to Nathan A. Womack

Beneath the muscularis in the wall of the gallat other times relatively large ganglia. These probably represent vagal pathways. The pain fibres to the biliary tract extend along the hepatic and cystic artery. These fibres extend through the musculature and apparently terminate in the mucosa or possibly between the epithelial cells of the mucosa. These fibres have no specialized endings, but terminate as exposed raw nerve fibres. The pathological changes associated with the nerves of the gall-bladder consist for the most part of fibrosis and inflammation. The lymphocytic reaction is often seen only around the nerve. This may be due to the close proximity of the nerve trunks to the lymph channels. Such an area of inflammation is associated with increased irritability on the part of the nerve. The stimulus probably is that of the increased intracystic or intraductal pressure, either due to abnormal closure of the sphincter of Oddi, or due to spasm of the sphincter or duodenum, or some other portion of the biliary tract. The association of pain, nausea and vomiting, with increase in intraductal pressure, has been noted by Schrager, Ivy, and others.'

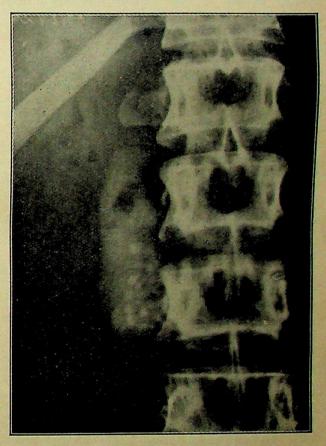


Fig. 5.—Skiagram showing the gall-bladder much enlarged and containing multiple calculi.

The above symptoms in the patient might have been due to sudden increase in pressure in the intra-biliary tract as a result of muscle spasm. In those patients with severe gall-bladder disease who are not completely relieved of their symptoms after cholecystectomy, it is possible that there is a certain amount of nerve damage around the common duet which is responsible for the symptoms.

Case 5.—Male, aged 48. Admitted on 22nd September, 1937, for jaundice, pain over the left iliac fossa, and loose motions with blood and mucus. He gave a history of dysentery two years previously. Dysenteric stools were absent for one year, but for the last three months he had been passing blood and mucus, with pain all over the abdomen, most marked over the left iliac fossa. Jaundice for one month. Right hypochondrium very tender. van den Bergh test positive indicating

some biliary obstruction. The jaundice disappeared after treatment with biliary stimulants, and van den Bergh test became negative. No ova were found in the stools and sigmoidoscopic examination showed no lesion in the rectum. Blood transfusion was done as the patient's condition was very low, and the gall-bladder removed on 30th November, 1937. The gall-bladder was comparatively free from adhesions and there was not much change in the colour of the viscus, but the blood vessels on its surface were very much dilated and the common bile duct was bigger than normal. The convalescence was smooth and the patient was discharged free from all symptoms and very much improved in health.

In this case the most noticeable symptoms were those of colitis, and history of old dysentery was present. Side by side there were symptoms of gall-bladder lesion as well. It is difficult to say if the gall-bladder lesion was secondary to an attack of dysentery or the irritation of the colon was due to a pathological gall-bladder.

Case 6.—Male, aged 30. Admitted on 11th December, 1937, for abdominal pain of about two years' duration. Pain started suddenly, was of an intermittent character, and worse after food. For the last two months pain had become very severe. Slight jaundice was present at the time of admission. Patient gave history of having passed blood with urine. X-ray showed no abnormality of the kidneys or the gall-bladder van den Bergh test was found to be indirect positive. Gall-bladder area was very tender. On opening the abdomen the gall-bladder was found to be slightly enlarged, pale yellowish in colour, and on palpation stones were found to be present inside the organ. Cholecystectomy was done. Convalescence was smooth, except for an attack of parotitis. The patient was discharged free from all symptoms, and much improved in health.

In this case an unusual symptom, viz, blood in the urine, was present, although the lesion was in the gall-bladder. Cholecystography showed a normally functioning gall-bladder, although it contained multiple stones.

Case 7.—Male, aged 40. Admitted in October 1938 for severe abdominal pain with jaundice and slight fever. Morphine was tried for the pain without any benefit. Glyceryl trinitrite tablets were also ineffective. So the homoeopathic drug 107–1 mentioned above was given, and it completely relieved the pain, and the jaundice also gradually disappeared. The gall-bladder, which was much atrophied and friable and contained a number of small stones of mixed variety, was removed. The patient was discharged free from all symptoms.

Case 8.—Male, aged 42. Admitted in December 1938 for operation of hydrocele. He was very healthy looking, but he complained that he was getting repeated attacks of angina pectoris. He had been diagnosed as a case of pseudo-angina, as the physicians could not find anything wrong with the heart clinically. He got such an attack while convalescing from the hydrocele operation. He complained of very severe pain in the heart area, and was found lying quiet in the bed with his hand on the chest, resenting any interference. There was no change in the pulse, nor was there any dyspnœa. The attack lasted for about seven minutes. No residual symptoms could be detected after the pain disappeared. On examination well-marked tenderness was found in the gall-bladder area and the epigastrium, but nothing abnormal could be detected in the pre-cordial region. Westphal's syndrome was positive. On being questioned about the history of the disease, the patient said that about eight years previously, when the province of Gujrat suffered from severe floods, he had to live for some weeks on the second story of his house in the flooded area of his village. The stay in

the damp atmosphere caused severe gastro-intestinal trouble, from which he suffered for some months. Since then he had been getting these so-called anginal attacks.

Most probably this was a case of chronic cholecystitis giving rise to attacks of pain resembling angina pectoris. Unfortunately the diagnosis could not be confirmed as the patient did not submit to further investigation. The coronary arteries are activated by a pathological gall-bladder. The other theory is that there is a disturbance in the viscero-sensory reflex. Irritation of the spinal nerves due to the disease of the gall-bladder is carried to the sensory plexus supplying the aorta and the coronary vessels, producing pain of angina pectoris. Cases have been quoted in which surgical treatment of the gall-bladder has been followed by relief of cardiac pain. A study of morbid anatomy reveals the fact that in subjects with disease of the gall-bladder, the degree of arterial degeneration is higher than in those with normal gallbladder. So it would appear to be rational to deal thoroughly with cases of cholecystitis or gall-stones as soon as diagnosed.

### Summary

1. Gall-bladder diseases are very common in India, although stones in the gall-bladder are comparatively rarer than in the West.

2. The majority of patients with cholecystitis gave a history of an attack of typhoid or dysentery and some sort of irregularity in their mode of diet, such as long intervals between meals, absence of fats, etc. Alcohol was responsible for the pathological condition of the gall-bladder in about 10 cases.

3. Gall-bladder pain may be due in many cases to disturbances in the nervous system particularly vagotonia, without any pathological condition of the gall-bladder being present.

4. Meat diet was not found to be an important ætiological factor in cholecystitis, as many of the patients were pure vegetarians.

5. Pathological conditions of the gall-bladder may give rise to symptoms of angina pectoris and may in advanced cases cause degeneration of the heart muscle and of the whole arterial system.

6. After cholecystectomy post-operative pain is very common, and may occur for some months. It usually disappears with belladonna and some alkaline mixture.

7. Jaundice is not a very common complication of gall-bladder disease, nor is pain in the right shoulder. But pain in the angle of the right scapula is often present.

8. The presence of Westphal's syndrome is diagnostic of gall-bladder disease, but jts absence does not exclude lesion of the gall-bladder.

9. Cholecystography cannot always be depended upon in diagnosing pathological conditions of the gall-bladder.

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> and P. A. MAPLESTONE, D.S.O., D.SC., M.B., B.S., D.T.M. (From the Dracontiasis and Filariasis Inquiry under the Indian Research Fund Association, School of Tropical Medicine, Calcutta)

> THE ADULT OF MICROFILARIA MALAYI

BRUG, 1927

By S. SUNDAR RAO, L.M.P.

FILARIAL infection in North Travancore is caused by the adult of Microfilaria malayi (Iyengar, 1938). One of us (S. S. R.) carried out field-work recently in this area with the object of isolating adult parasites of this infection, as they have not so far been described. One patient in Shertalai area showed a cyst on the right forearm which was suspected to be of filarial origin. The blood examination of this patient showed Mf. malayi. The cyst was aspirated and four adult worms were obtained with lymph. The lymph from the cyst was full of embryos which on examination were found to be Mf. malayi. Neither the blood of the patient nor the lymph showed any Mf. bancrofti. The adult worms were transferred immediately to normal saline in a petri dish and were subsequently preserved for detailed examination. Of these worms two were males and the other two females. One of the females was broken by the sharp point of the needle during aspiration, the other specimens were complete.

All the worms were alive and were observed to be somewhat sluggish in their movements in the saline solution unlike Wuchereria bancrofti, which move actively with a screw-like movement in normal saline, and live for several hours outside the human host. These worms did not show much activity even after warming the saline to body temperature (37°C.) and they died after about half an hour.

In general appearance they are similar to Wuchereria bancrofti. The adults of Mf. malayi are fine thread-like, white worms, both the sexes living coiled together in the dilated lymphatics. The tapering anterior end shows a rounded head

(Continued from previous page) 10. Chronic inflammation of the gall-bladder is followed by fibrosis of the nerve ganglia incorporated in the wall of an inflamed gallbladder; and irritation of these ganglia and nerve terminals due to distension of the organ gives rise to the typical gall-bladder pain.

The author's thanks are due to Messrs. R. D. Nayak and R. S. Savardekar, artists, G. S. Medical College, Bombay, for the diagrams published in this article.

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and neck, and a mouth without lips. There are two rows of tiny papillæ running round the head. The posterior end is spirally curved in the male similar to the tail of W. bancrofti. In the female the tail tapers to a bluntly rounded tip. The cuticle is smooth and without any transverse striations.

Female.—One complete female measured 55 mm. in length with a diameter of 0.16 mm. The mouth is terminal and without appendages or lips. The œsophagus is a thick muscular tube with a narrow lumen measuring 1.38 mm., the intestine is a thin simple tube, which in the complete specimen is not clearly visible, being pressed to one side by the fullypacked uterine tubes. The anal opening is 0.94 mm. from the tip of the tail. The vulval opening is 0.92 mm. from the anterior end in one specimen and 1.04 mm. in the other. This opening is a narrow transverse slit measuring 0.036 mm. The beginning of the vagina is narrow (0.045 mm. long). It begins to widen gradually from this point. The general course of uterus and its branches ending in the ovaries is practically the same as that of W. bancrofti.

The ovum varies greatly in size, and generally has an ovate outline, measuring 0.027 mm. long and 0.018 mm. broad. The embryos can be seen doubled up inside the shell and higher up they can be seen in a more advanced stage of development where the length of the embryo is considerably longer.

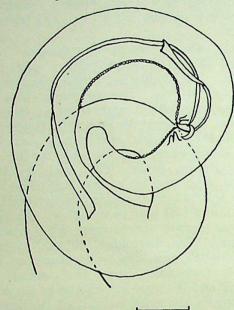
Male.—The worm measures 22 to 23 mm. in length with a diameter of 0.088 mm. The œsophagus is 1.12 mm. long, the alimentary canal is straight and ends in the cloaca. The tail is curved spirally showing three turns.

There appear to be two pairs of large papillar one immediately in front of and the other just behind the cloaca and in close apposition to them there are two pairs of smaller papillæ. No other papillæ could be observed. The ventral surface of the worm shows fine transverse corrugations similar to those seen in W. bancrofti. The cloaca opens 0.1 to 0.14 mm. from the tip of the

The spicules are dissimilar and unequal. The long spicule measures 0.34 to 0.36 mm. in length; it is composed of a stout basal portion and ends in a fine lash-like portion approximately twothirds of the total length. The tip shows a small membranous spoon-like expansion. The small spicule is 0.11 to 0.12 mm. in length and is almost uniformly broad from base to tip. It should be noted, however, that when seen from the side in an unextruded state the distal third appears much thinner than the proximal two-thirds and it has a sickle-like curve (figure 1). This appearance has already been noted by us in the case of W. bancrofti (Maplestone and Sundar Rao, 1939) and is probably caused by a twist in the spicule to accommodate itself to the curve of the tail when in the retracted position. There is a small boat-shaped gubernaculum.

### Discussion

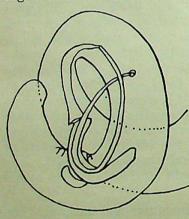
with This worm is practically identical W. bancrofti in nearly all its characters. The females are quite indistinguishable.



0.05 mm.

Fig. 1.-W. malayi n. sp. Male tail, spicules retracted.

In the case of the males we have had the opportunity over the past few years of examining five or six adult male W. bancrofti and are



0.05 mm.

Fig. 2.—W. malayi n. sp. Male might be consitail, spicules partly extruded.

quite satisfied that they possess nine pedunculated caudal papillæ and narrow caudal alæ, but there is a good deal of evidence that these structures show some variation. On account of the discrepancies in the description of the male W. ban-crofti, which Maplestone (1929) discussed, it is probable that the present worm identical dered

with it, but as we have had the opportunity of comparing the two side by side we are able to distinguish the difference in the tail papillæ. Also, the spicules of the new species are of the same general characteristics, but when seen side by side it is obvious that those of the new species are much more delicate than those of W. bancrofti and they also

(Continued at foot of next column)

### A SIMPLE AND INEXPENSIVE .FLEA-PROOF CAGE

By C. L. PASRICHA MAJOR, I.M.S.

Professor of Bacteriology and Pathology and

G. PANJA

Assistant Professor of Bacteriology (From the Department of Bacteriology and Pathology, School of Tropical Medicine, Calcutta)

A SIMPLE flea-proof cage that can be made in any small workshop and which has been found useful in plague experimental work during the last five years is described. The accompanying diagram illustrates the cage. It is made from an empty kerosene-oil tin. Two glass windows are inserted on opposite sides of the cage, and a platform of wire mesh (4 to the inch) is arranged inside the cage. A removable lid about 11 inches deep is prepared. A third of this lid is cut away and fine-meshed (40 to the inch) good quality copper or brass gauze is fixed by soldering, or better still by soldering a strip of tin over the free edges. A shallow (about ½ inch deep) removable tray is fitted near the bottom of the tin and the box stands on four legs  $(1\frac{1}{2}$  inches long). Two tin tubes are soldered into the lid. One of these tubes is fairly wide (about 1 inch in diameter) to allow the passage down of food and the other narrower for drinking water. There are well-fitting tin caps for these tubes. Below the tubes is a small trough divided into two compartments by a partition, the smaller one being for water and the other for solid food. It is advisable to arrange two small hooks on the wall of the cage into which the trough can be fixed.

The cage can be prepared by any intelligent workman and the whole outfit does not cost more than two rupees. It is advisable to paint the cage with a good quality white paint.

(Continued at foot of opposite page)

(Continued from previous column)

lack the distinct transverse corrugations on the stout portion of the spicules seen in W. bancrofti.

These differences are so slight that alone they might be considered insufficient on which to base a new species, but in addition to them there are the differences in the microfilariæ which have been recognized for many years and the fact that the insect host appears to be always Mansonioides annulifera whereas W. bancrofti It known to develop chiefly in Culex fatigans. It is accordingly proposed to name the worm Wuchereria malayi n. sp. following the name given to the microfilaria by its discoverer.

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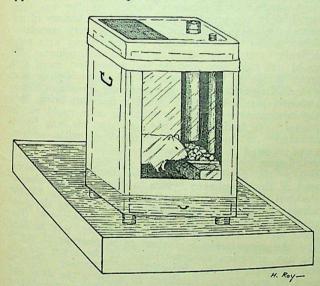
# TOPICAL APPLICATION OF SULPHANILAMIDES

By A. C. DEY, L.M.F. Deputy Surgeon, Ashtanga Ayurveda Hospital, Calcutta

MUCH has been written on the efficacy of sulphanilamide compounds in streptococcal and other bacterial infections when administered by the mouth and parenterally, but I do not think very many publications have appeared in this country on their local use. Jaeger (1936) was the first to write an exhaustive report on the local use of prontosil in a variety of dermatological conditions. The earliest reference to the local use in a case of streptococcal empyema was by Douthwaite (1937) in which 5 c.cm. of prontosil solution was administered through the

(Continued from previous page)

For use the cage stands in a shallow trough containing a disinfectant lotion and when the animal has been introduced the space between the flange of the lid and the body of the cage is covered with sticking plaster, which can also be applied over the caps of the tubes soldered into



A simple and inexpensive flea-proof cage.

the lid. The level of water in the trough is well above the removable tray in the bottom of the box. The animal is about  $2\frac{1}{2}$  inches above the water level. Fresh food can be given to the animal the animal through the tubes and any accumulation of excreta can be removed by removing the tray. If desired, a tightly-fitting pledget of wool can be fixed on the top of the food and water tubes. When the animal is dead chloroform is poured in to anæsthetize any fleas that have dropped off from the animal before the cage is opened. After use the whole cage is dipped into a disinfectant lotion or can be boiled in water in a suitable container. A cage can be used several times. The advantages of this cage are that (1) it can be readily made, (2) its cost is minimal mal, and (3) the animal is visible throughout the experiment.

intrapleural route prior to probable rib resection. This, however, proved to be unnecessary as in three days the pus was thinner and sterile. Subsequently, Brown (1937) reported two similar cases of empyema in which prontosil was inserted into the pleural cavity. These cases were cured without rib resection being necessary. Bosse tried prontosil locally in purulent inflammation of the tonsils and bronchi. He used it in the form of a spray, paint, or gargle, and in tonsillar abscess by injecting prontosil soluble directly into the abscess. Lamers (1938) had good results with local application of prontosil in pyodermic abscesses, furunculosis, erysipelas and herpes zoster. A report of the successful results obtained by inhalation of prontosil soluble in one hundred cases of different kinds of bronchitis is given by Franke (1939). References on the intrathecal and intravenous use of these compounds are also available. As far as the mode of action in local application is concerned, no explanation has yet been put

forward by any worker.

Encouraged by these findings, I was tempted to use sulphanilamides for local dressing of wounds in a series of 20 cases. This includes cases of boil, small non-diabetic curbuncle, ulcer, cellulitis, abscess, infected traumatic lesions, and similar minor localized purulent affections. In my trials, urea sulphazide, a sulphanilamide compound marketed by Messrs. Union Drug Co., Ltd., was employed. The preparation was used in the form of a two and a half or five per cent solution and as a five per cent ointment. The usual mode of application was that after the pus was let out by incision the solution was spread over the wound and kept covered with dressings or a gauze soaked with the solution. This process was repeated every day. It has been found that for straight and ordinary cases four to five dressings with a 2½ per cent solution were sufficient to control the infective process. For the more intractable cases, however, the concentration of the solution was increased to five per cent. As a follow-up treatment, when the purulent discharge had ceased, the ointment

The following are illustrative cases:-

Case 1.—G. C., Hindu male, aged 35 years, developed scrotal abscess. Pus was let out by an incision. The first dressing was commenced with a 2½ per cent solution and changed every day. Altogether eight such dressings were necessary. After that the ointment was applied, at first every alternate day and then every third day.

He made an uneventful recovery.

Case 2.—R. L., Hindu male, aged 45 years, developed sub-pectoral abscess on the left side which was incised. sub-pectoral abscess on the left side which was incised. The pus pocket was deeply under the muscle. Before insertion of the 2½ per cent solution, the wound was daily irrigated with normal saline. For four days it failed to show any improvement. From the fifth day onwards a 5 per cent solution was used. The very next day the character and quantity of the discharge seemed improved. Altogether eight more dressings were required. The superficial wound was ultimately dressed with the ointment to effect a cure.

\*\*Case 3.—R. G. Hindu male, aged 26 years. He had

Case 3.—R. G., Hindu male, aged 26 years. He had an axillary abscess. This wound was dressed daily with a 2½ per cent solution. Altogether ten dressings were

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necessary. The ointment was as usual applied to effect a cure.

In none of these cases was any supporting treatment done, except that the margins of the wounds were cleansed with alcohol.

Advantages observed with this dressing are:-

(1) It is non-irritating.

(2) Early control of the purulent discharge, and healthy granulation appears quickly.

(3) It is comparatively non-expensive, partic-

ularly with a 21 per cent solution.

In conclusion, it may be stated that, although it is too early to draw any definite conclusion as to the efficacy of this type of dressing on observation of such a small series of cases, it seems probable that for such minor local infective process local sulphanilamide therapy has some bacteriostatic effect; this renders active assistance to the natural defences of the body to gain the upper hand, and thus helps the regeneration of the damaged and disintegrated tissues.

I desire to express my grateful thanks to Mr. B. Mukerjee, the Deputy Surgeon, Outpatients' Department, Ashtanga Ayurveda Hospital, for his help in conducting trials in some of

these cases.

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#### of Hospital Practice Mirror

### PRONTOSIL ALBUM IN GANGRENOUS STOMATITIS

By TEHL RAM

Sub-Assistant Surgeon, In-charge Civil Dispensary, Banjar, Kangra Dist.

A MALE child, aged about 10 years, was admitted for frequency of stools with blood and mucus for 20 days, following an attack of measles. The patient was extremely emaciated with subnormal temperature and pulse about 120 per minute. Stools, 20 to 30 in a day, consisted of only blood and mucus. Treatment with emetine, kaolin, bismuth and rectal washes caused the frequency of stools greatly to diminish and blood and mucus was only occasionally seen.

One morning, glossy ædema of the cheeks and feet was observed and on inspecting the mouth cavity, sloughing and foul-smelling black ulcers were found on the outer sides of both upper gums and on the lower

the outer sides of both upper gums and on the lower gums anteriorly. The sloughing had already involved the whole breadth of gums and the portion affected was quite loose. The case was becoming hopeless. The separated slough being removed, pure nitric acid was applied to the advancing margins and potassium permanganate and hydrogen peroxide solution gargles given. Prontosil album 4 tablets a day were given. Fourteen tablets were given altogether. During this time, cedema of face and feet disappeared, advancement of the ulcers stonged and within about a weekment of the ulcers stopped and within about a week the gums became healthy.

The result is remarkable when compared with past experience of such cases which were invariably fatal.

I am indebted to Dr. G. W. Hardy, Civil Surgeon, Kangra, for his permission to publish

this note.

### CARDIO-SPASM OF ŒSOPHAGUS

By SUDHIR KUMAR BASU, M.B. Assistant Surgeon, E. I. Railway Hospital, Jamalpur

THE case reported by M. G. Kini in the Indian Medical Gazette, January 1939, reminds me of a similar case treated recently at the Jamalpur E. I. Railway Hospital. At first it was wrongly diagnosed as malignant disease of the stomach. The patient belonged to the male sex and was past 40. As, according to Kini such cases are rare I venture to publish this case. without attempting to explain or discuss it.

The patient, a Hindu male, aged 42, a workman in the Railway Workshop at Jamalpur, was admitted to the Jamalpur Railway Hospital on 7th December, 1938, for difficulty in swallowing of about two years' duration. There was no history of acidity, indigestion, taking a corrosive or irritant drink, or of having ever sufferd from cardiac or respiratory trouble, neither was there any history of syphilis. Considering the history of two years, the patient did not seem to be very emaciated. When asked to drink water, he took some with great difficulty but vomited it in about ten minutes. He could not take dry biscuits and bread but could with great difficulty take a portion of them with sips of water. Palpation did not reveal the presence of any water. Palpation did not reveal the presence of any abdominal neoplasm nor could percussion bring forth any abnormal dullness. A stomach tube could not be passed; on taking the tube out its tip was bloodsmeared. A fluoroscopic examination with contrast meal showed a clear shadow at the upper part of cesophagus without any sign of pressure or obstruction. But as the meal came near the diaphragm the lower part of the cesophagus began to dilate and the shadow changed gradually from tubular to pear-shape till the part of the œsophagus began to dilate and the shadow changed gradually from tubular to pear-shape till the whole cardiac area was covered. No part of the meal could be seen to pass down into the stomach. The posterior mediastinum was free. There was nothing like the characteristic shadow of a pharyngeal pound nor any adhesion or constriction at the lower pole of the œsophagus. An injection of atropine sulphate gr. 1/50 was given. In about 15 minutes the meal was seen to pass down to the stomach and the pear-shaped œsophageal shadow disappeared. The behaviour of the shadow at first suggested the existence of a cul-de-sat or some kind of an obstruction at the lower end of or some kind of an obstruction at the lower end of the exophagus, but this suspicion was removed by the effect the injection of atropine had in relieving the condition.

The case was treated for several days with meals injection of atropine sulphate gr. 1/100 before followed by a belladonna mixture. Good effect was reported all the time he was in the hospital. He was discharged from the hospital on his own request. The patient was again screened with a contrast meal and the several with a contrast meal of the patient was again screened with the patient was again and the patient was again screened with the patient was again and the patient was again.

The patient was again screened with a contrast very on 2nd May, 1939. Though his condition was much improved he was at times having the same difficulty in swallowing as before

My thanks are due to Dr. S. C. Chatterjee, e Chief Medical Off the Chief Medical Officer, and Dr. G. E. Paulthe Divisional Medical Officer the Divisional Medical Officer, and Dr. G. E. L. for allowing me to publish of the Divisional Medical Officer, E. I. Railway, thanks allowing me to publish these notes. My thanks are also due to my colleague Dr. S. C. Chow the dhury who took a great interest in treating and dhury who took a great interest in treating and following up the

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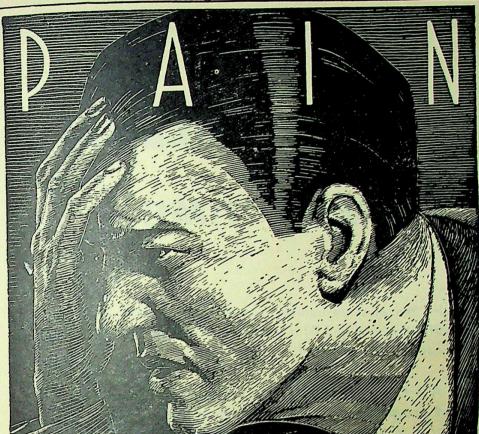
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# HEADACHE IS DISABLING

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# RADIOSTOLEUM IN WAR TIME

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As soon as the first symptoms appear Radiostoleum should be prescribed. The treatment will not only overcome the ocular disturbances but it will prevent the development of more serious sequelae, such as susceptibility to bacterial infection and proneness to dental caries and subnormal skeletal development. It is most important, however, not to wait for manifestations of vitamin deficiency, but to administer Radiostoleum as a routine to patients of all ages, particularly to pregnant women, growing children and those who are prone to colds, influenza and similar ailments.

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# Indian Medical Gazette

### MARCH

# HOSPITAL ORGANIZATION IN INDIA

Probably the most serious check to general medical progress in this country is the inadequacy of hospital organization; the extent of this inadequacy may be judged by the immense area that is served by each hospital, by the smallness of the numbers of beds per head of population, and by the extremely poor quality of the accommodation and attention provided in the hospitals. Some relevant figures are given in an interesting review of the position in India by Colonel Chopra, which will be found elsewhere in this issue, and also in Major-General Bradfield's Indian Medical Review published at the end of 1938.

The area served by each dispensary varies considerably, even if we leave out of consideration two exceptional administrative areas-Delhi province with its compact population of over 1,000 per square mile, and a hospital or dispensary for every 24 square miles, and at the other end of the scale the sparsely populated Baluchistan where each hospital or dispensary has to provide for an area more than fifty times as great, 1,327 square miles. In the Central Provinces each hospital or dispensary has to serve an area of 291 square miles against 54 in Bengal. But whilst Bengal heads the list for the number of hospitals and dispensaries, it is obvious that bedless dispensaries predominate, for the average number of beds in these institutions is only 7 against 28 in Bombay, 16 in the Punjab, and 14 in Madras. In Bengal each hospital bed has to serve a population of 5,000 persons and the figure for the whole of India is calculated at 0.3 beds per thousand.

On the matter of the quality of the treatment given to the occupants of these beds, it is difficult to find terms in which this can be measured, as there are so many factors concerned; excluding consideration of the medical personnel, we still have the accommodation, the surgical and other equipment, the nursing, and the diet and general medical comforts. Perhaps the easiest factor to put into figures is the nursing. For the whole of India the number of beds per nurse is 14, or seven nurses per 100 patients; this, after allowance is made for night and day nursing, the administrative and theatre staff, and the leave roster, is a ridiculously small figure. In the teaching institutions in the large cities, the number of nurses per 100 beds is of course much larger, 20 or even 30, which is still far below the British and American standards, but this but this larger number in the teaching institutions only means that in other hospitals the number of nurses is correspondingly low; in

Bengal as a whole there are 12 beds per nurse, excluding midwives and male nurses, which had they been included would bring the figure down to 9 or 10. In Madras there are 10, and in Bombay just over 9 beds per nurse. It is the frequent complaint of the rural civil surgeon that he dare undertake nothing but emergency or very simple surgical operations because of the total inadequacy of the nursing arrangements.

The hospital is an ancient institution. In early Greek history there are frequent references to hospitals, both as teaching centres and for the care of the sick, and similarly in India there are early historical accounts of the founding of hospitals, for poor and sick. In Europe, even through the Dark Ages, hospitals, which were mainly refuges for the sick and needy, survived and there is a hospital in London still occupying the site which was given to it by Royal Charter in the year 1137. But in India hospitals disappeared for many centuries until they were

reintroduced by the British.

At the beginning of the last century, hospitals were not popular and one has only to read the accounts by contemporary writers of the hospitals that existed in those days to understand why. In the pre-Listerian days the total mortality of patients entering hospital was appalling; even if the diseases from which they suffered were easily curable, they usually managed to acquire some other affection, and a woman entering a maternity hospital invariably suffered from sepsis. But with a better understanding of what constituted infectiousness and the introduction of antiseptic and aseptic practices, hospitals ceased to be the death-traps that they undoubtedly were, and, after the natural prejudice against them had gradually disappeared, they became popular and to-day in most advanced countries the demand for hospital treatment far exceeds the accommodation available. The appreciation of the advantages of hospitalization is at its highest in the United States of America (the word itself surely originated on that side of the Atlantic), and in that country few women will choose to be confined in their own homes. The hospital habit is developed far more highly in some European continental countries than it is in Great Britain, where incidentally the war has focused a great deal of attention on the present hospital system with its advantages and disadvantages. But in Great Britain there are about five beds per thousand of the population and even then many patients in need of hospital treatment are turned away. The great advantages of hospital treatment are rapidly being learnt by the people of India. In the larger cities, there is always a waiting list for admission for any but emergency cases, and it has been said facetiously that it requires more influence to get a bed for a hydrocele operation in a certain large Calcutta hospital than to get a seat in the Legislative Assembly; whenever a hospital is not full one

may be sure that there is something wrong

inside the hospital walls.

New ideas in medical treatment rapidly seep through to the illiterate ryot who forms the bulk of India's population. A good example is the parenteral injection; 25 years ago the sight of a syringe frightened a patient into absconding from hospital, to-day the same patient thinks he is being unfairly treated if he is only given medicines by the mouth. The hospital idea is firmly implanted in the Indian mind and it will continue to grow. The problem is to meet the increasing demand for hospital accommodation. The tendency is to attribute the lack of hospital accommodation to India's poverty, or alternatively to the failure of the government to do something about it, but the trouble is deeper and goes back further than

We will not attempt here to trace the growth of the hospital system in other countries, except to note that in practically all European countries, the first hospitals were founded by religious bodies and were charitable institutions. They were often given the blessings of the government of the day but no more and sometimes less, in that their funds were frequently confiscated. It is from such beginnings that the 'voluntary' hospital system, which until recently was the mainstay of British medicine, evolved. No counterparts, either of these early religious institutions, or of the present voluntary hospitals, exist in India. The first hospitals in this country (within the last millennium) were founded by the British Government or by Christian missionary bodies, and it is only within very recent times that other religious bodies have followed this example.

The government hospitals, in particular, were modelled on the British system, modified to suit Indian conditions, so that they have never had the advantage of natural growth through which process British hospitals have passed. The case of the missionary hospitals is somewhat different; most of these have developed from small beginnings, and though poorer and not so well equipped they are often quite as well suited to the requirements of the people as are the more pretentious government hospitals. Another big group is formed by the municipal and district board hospitals. Nearly all the hospitals in India can be placed in these three groups, and in the country as a whole they each provide

about one-third of the beds.

The proportion of hospital beds already provided by the central and provincial governments is far in excess of those provided by the governments in most other countries, and they cannot be expected to provide more, except for special purposes as for example in connection with medical education. It is not really desirable that they should, even if they could afford the money, which in these days they obviously can not. Nor will the problem be solved by Indian philanthropists building large hospitals on

which their names may be inscribed but which through lack of endowment and of any local support, remain half empty and even then have

to be maintained by government.

In other countries the hospital system has been built up by the people themselves; in this country the beginnings have been made by the government and foreign missionary bodies, the interest has been created, and it is for local enterprise with the aid of local philanthropists to carry on the work. There are many missionary hospitals in India which though started and still helped by funds collected in other countries are now almost self-supporting; by charging fees to those who can afford to pay, they have been enabled to provide free treatment for the really poor and it is on this principle that hospitals of the future will have to be built up. Colonel Chopra, in the paper to which we have already referred, has suggested that the almoner system should be introduced into government hospitals. Something of the kind will have to be done, but it will be difficult to put into effect, for the government is always looked upon as fair game and many, who will conspire to defraud the government by con-cealing the truth, will hesitate to cheat the local community, and, further, their fellow citizens

will see that they do not do so.

Finally, the idea of personal service must be further developed in India. The shortage of nurses is a serious handicap to progress in hospital provision. For many years only Europeans and Anglo-Indians came forward for training as nurses and even now the profession of nursing does not appeal to the educated Indian, but if there is to be any marked improvement in hospital provision a very large body of nurses will be required; these cannot be provided by one community, and the leaders of all communities must endeavour to change the present attitude and encourage their educated young women to take up nursing. That the facilities for training nurses are not ideal is perfectly true, but recently, though efforts have been made to improve these and induce more better-class Indians to take up this profession, the response has been disappointing. Perhaps the most serious obstacle to progress is the poor provision that is made for nurses, both in the matter of pay and of accommodation; it is not a good sign that recently the funds raised for building a new hospital in Calcutta were expended on the provision of an up-to-date hospital building without any balance being left for the nurses' quarters, more particularly in view of the fact that this was a women's hospital and that women were mainly concerned in the organization and management of the fund.

The problem of hospital accommodation in India is not simply an economic one; it will not be solved with the be solved until the civic conscience is more fully developed, and the people begin to realize that an impressive façade does not compensate for poor medical treatment behind it, that a good

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nursing staff is more important than an x-ray apparatus, and above all that the provision of

hospital treatment for the sick is their own local responsibility.

# Special Articles

# HÆMATOLOGICAL TECHNIQUE

### PART II

By L. EVERARD NAPIER, M.R.C.P. (Lond.) and

C. R. DAS GUPTA, M.B. (Cal.), D.T.M. From the School of Tropical Medicine, Calcutta

(3) Enumeration of erythrocytes in the peripheral blood

ERYTHROCYTES and leucocytes are expressed as the number of cells per cubic millimetre (c.mm.) of blood.

Principle.—In enumerating the red or white cells, oxalated venous blood from the flask (or capillary blood from the finger or ear lobe) is taken into a red or white cell pipette up to a certain mark, and the pipette is filled with the diluting fluid; it is then shaken, and a drop of the mixture is put into a special counting chamber, where the cells within some specified ruled area are counted, and finally the total number of cells per c.mm. is calculated.

The necessary dexterity to carry out the various manipulations in the different stages of making a blood count can only be acquired by practice. Further, close attention must be paid to every detail of the technique, if accurate

results are to be obtained.

# Apparatus required

Microscope.

Hæmocytometer with counting chamber, preferably with Neubauer ruling.

Red and white cell pipettes.

Coverslip. Diluting fluids. Watch-glass.

The ideal would be to use certified counting chambers and pipettes, but, where this is not possible on account of their high cost, only those which are manufactured by reliable firms (viz, Carl Zeiss, Bausch and Lomb, etc.) should be used and these should at least be checked against certified instruments.

Counting chambers.—There are various types of counting chamber in use. The new types of chamber have two main advantages over the old

Thoma chamber :-(1) The coverslip can be placed in position upon its base before the blood is introduced and this may be done slowly and with the care that is essential to ensure the appearance and persistence of Newton's colour bands at the surfaces in

(2) The uneven distribution of the corpuscles on the counting surface, which is liable to arise in the original chamber devised by Thoma and

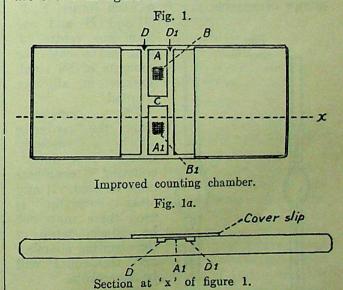
is due to the rapidity with which the corpuscles, especially the red ones, tend to settle in the diluent, is obviated; the new chambers are so devised that the diluted blood rapidly enters the counting space by capillary attraction.

In the new types of chamber, e.g., Neubauer, Bürker, etc., the counting space is oblong and divided into two compartments by a transverse groove, both of which contain a ruled area for counting the red as well as the white corpuscles. These two counting areas afford a means of making duplicate counts with a single application of the coverslip.

In our laboratory we have used chambers with Thoma, Bürker and Neubauer rulings, but for over two years we have been using only chambers with the Neubauer ruling which is simpler to use than the Bürker. With a single application of the coverslip, a larger area for the leucocyte count, four square millimetres on each side of the chamber, as opposed to one square millimetre in the Thoma type, is obtained.

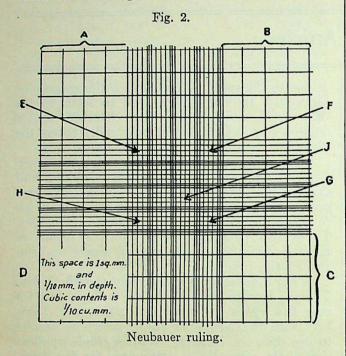
Counting chamber with improved Neubauer ruling

The different parts of the counting chamber are shown in figures 1 and 1a.



The middle platform A-A1 is exactly 0.1 mm. lower than the two side platforms. When the coverslip is placed upon the platform, there is a space exactly 0.1 millimetre deep between it and the ruled area on the platform. Upon the ruled area, there are nine large squares, one square millimetre each, separated by double

The four large corner squares A, B, C and D, are the areas in which the leucocyte count is made (figure 2). Each of these four square millimetres is subdivided into sixteen squares to facilitate counting.



The square millimetre in the centre of the ruled area is used for the red cell count. It is subdivided into 400 smaller squares each of which is therefore  $\frac{1}{400}$  of a square millimetre.

To facilitate counting, these 400 small squares are cut up into 16 groups of 16 small squares each, by extra lines which are drawn through every fifth square. Red cells in the five small groups of squares, one from each corner, E, F,

G and H and one from the centre, J, that is to say, the contents of 80 small squares in all, are counted.

The coverslip.— Only the coverslip which is specially designed for bloodcounting chambers must be used. If any other coverslip used there may not be uniform depth in the counting chamber and the count will be inaccurate.

The blood-counting pipettes (Thoma type)

The capillary portion of both the red and white cell pipettes (figure 3) is divided into ten equal parts from the tip to the bottom of the

bulb, the fifth and the tenth marks being denoted by figures 0.5 and 1, respectively There is another mark just above the bulb where the figure 101 is given on the red cell pipette and the figure 11 on the white cell pipette.

To facilitate mixing, there is a bead in the bulb, which is sometimes coloured red in the red cell pipette to distinguish it from the white cell

pipette.

Diluting fluids.—For the red cell count we have found the following solution the most satisfactory :-

Sodium sulphate 12.5 grammes Glacial acetic acid .. 33.3 c.cm. Distilled water 200

There is neither clumping nor hæmolysis with this fluid. Other solutions recommended are Hayem's fluid,

(Mercuric chloride 0.5 gramme Sodium chloride ... 1.0 5.0 grammes Sodium sulphate ... Distilled water 200 c.cm.)

and simple physiological salt solution. We have not found either of these satisfactory, as clumping may occur with the former and hæmolysis with the latter solution.

For the white cell count we have found the following solution the best:

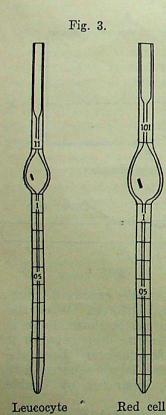
Glacial acetic acid ... 2 c.cm. Mercuric chloride ... • • 0.1 gramme Aniline gentian violet ... one drop to 100 c.cm.

The mercuric chloride will prevent growth of moulds when the solution is kept for a long time, and the gentian violet will give a slight tinge to the leucocytes and also make it easy to distinguish this solution from the red-celldiluting fluid.

When the diluting fluids are used, a small quantity should be put into a watch-glass or other suitable receptacle into which the pipettes charged with blood should be plunged. In no case should the pipettes be put into the original phials containing the diluting fluids, as there is every possibility that in course of time cells will find their way into this fluid and accumulate at the bottom of the phial; these may be taken up subsequently with the diluting fluid and vitiate the count.

### Enumeration of erythrocytes

(i) Filling the pipette.—Before using a pipette see that it is absolutely dry and clean and that the second and that the point is intact (the tips are easily damaged). With a dry red cell pipette suck blood up to the mark 0.5 (or 1 in the case of anomic policy). anæmic patients) by holding the pipette almost horizontally and at right angles to the line of vision so that the vision, so that the exact height of the column of blood can be seen easily. The blood should not go much be seen easily. not go much beyond the mark, but, if it does go a little beyond the mark, but, if the mark by applying the tip of the pipette to the tip of the first the first the first to the tip of the first the fir the tip of the finger a few times; cotton-wool of



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blotting paper should never be used as they will draw out the serum only and the cells in the pipette will become more concentrated. The blood adhering to the outside of the pipette is wiped off, and the pipette is plunged into the red-cell-diluting fluid in a watch-glass. The diluting fluid is drawn up exactly to the mark 101, the pipette being held nearly vertical and gently rotated between the thumb and the forefinger. The rubber tube is taken off and a tightly fitting flat rubber band is put on, closing both the ends to prevent any leakage. It is now laid flat on the table, or in the box.

When the pipette is filled, it will be seen that the entire capillary end of the pipette from the tip to mark 1 is occupied by diluting fluid. Hence, the true dilution of the cells is not 0.5 (or 1) in 101, but 0.5 (or 1) in 100, i.e., 1 in 200 (or 1 in 100). Thus, by taking blood up to the different marks from 0.1 to 1 in the pipette, dilutions ranging from 1 in 1,000 to 1 in 100 can be made.

If there be any air bubbles at any stage in filling up the tube with the blood or the diluting fluid, the whole preparation should be rejected and another pipette filled up, for it is never possible to get all the air out without loss of some fluid.

(ii) Shaking the pipette.—On every occasion, prior to the charging of the counting chamber with the diluted blood, the pipette should be shaken, preferably in a shaking machine or by rotating the tube, held horizontally, between the palms of the hands, first with the right hand on top and then the left, for about two minutes. The pipette should never be shaken in a horizontal direction, i.e., in the direction of its long axis, as this tends to throw the cells into the capillary tube.

(iii) Charging the counting chamber.—The counting chamber and the coverslip must be perfectly clean and free from dust or threads of cotton. Put the coverslip on the counting chamber so that it covers the ruled areas B and B1 (figure 1), and with the finger nail tap the coverslip to ensure good contact. Discard the first few drops of the diluted blood by blowing into the pipette. Next, holding the pipette in an inclined position of about 45 degrees, apply a small drop of diluted blood to that part of the platform A-A1 of the counting chamber which just projects from the coverslip; the drop will instantly pass under the coverslip by capillary attraction. The drop of blood should not be too large, or it will overflow the chamber and pass into the overflow trenches D-D<sup>1</sup>, and may even pass to the transverse trench C. Neither should the drawn between the dr the drop be too small as in that case it will not completely fill the counting surface. With a little practice a drop of the requisite volume can be put under the coverslip; any little excess on the plate. the platform should be removed by sucking with the pipette and never with blotting paper.

Small air bubbles are liable to be introduced into the counting chamber together with the diluted blood—

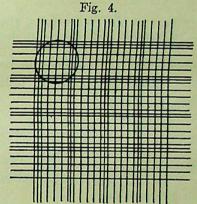
(i) if the counting surface and the coverslip are not previously cleaned with the requiste care, or

(ii) if the point of the pipette is chipped.

If there be any overflow into the trenches, or if there are any air bubbles remaining, the chamber must be cleaned and charged again.

### Focusing the ruled area

Great care is necessary in locating the ruled area without injuring the objective or disturbing the distribution of cells. This is most conveniently done by locating the ruled area first with the low power (two-thirds objective and 10 × eyepiece)—lowering the condenser or reducing the light by means of the iris diaphragm will show up the rulings distinctly (figure 4); the higher power (one-sixth objective) may then be substituted by simply rotating the nose piece of the microscope.



Thoma ruling as seen with \$rd lens. The black circle shows the field seen with the \$th lens.

### Counting the cells

Place the counting chamber on a horizontal surface for about 2 to 3 minutes to allow the cells to settle properly.

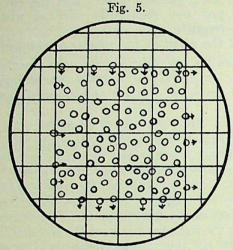
Focus the ruled area with the low power and also find out if the cells are evenly distributed—if not, another preparation should be made.

The cells in the squares can now be counted with the high power, one-sixth objective. The area from which the cells are to be counted will vary with the different types of ruling, but the same rule for cells on boundary lines should hold good in all cases.

Rules for cells on boundary lines.—All the corpuscles touching the upper line and the left-hand line of a square are considered to be inside the square, while those touching the lower line and the right-hand line of a square are considered to be outside the square (figure 5).

The cells contained on the five groups of small squares E, F, G, H and J in the middle of the ruled area of the Neubauer ruling are counted.

In all cases the cells on both sides of the chamber should be counted and the mean of the two taken. Should there be a difference of more



One field with & th lens showing which cells should be counted and which neglected.

than 5 per cent in the two counts, the chamber should be recharged and the count done again.

Calculations for erythrocyte count Each small square  $= \frac{1}{400}$  square millimetre. Therefore, the cubic dimension of each

 $=\frac{1}{400} \times 0.1$  (space between the coverslip and the ruled area) = $\frac{1}{4000}$  cubic millimetre.

And each group of 16 =<sub>4</sub> $\frac{1}{0}$  $\frac{6}{0}$ =<sub>2</sub> $\frac{1}{5}$  $\frac{1}{0}$  cubic millimetre. small squares Therefore, cells from

5 groups of 16

 $=\frac{5}{260}=\frac{1}{60}$  cubic millimetre squares each of diluted blood.

Thus, the total number of cells counted from 5 groups of small squares multiplied by 50 will give the number of cells in 1 c.mm. of diluted blood.

This, when multiplied by the diluting factor 200 (or 100) will give the number of cells in one cubic millimetre of blood.

Example.—Blood is taken up to 0.5 mark. Total number of cell counted in five groups of 16 small squares = 450. Therefore  $450 \times 50 = 22{,}500$  cells per c.mm. of diluted blood; and  $22,500 \times 200 = 4,500,000$ cells per

c.mm. of undiluted blood.

When, as in the above case, blood is taken to the 0.5 mark and the dilution is 1 in 200, the calculation can be simplified by adding four 0's to the total number of cells counted in the five small squares; e.g., in this instance  $450 \times 10,000 = 4,500,000$ .

For kigh counts, as in polycythæmia

One in 200 dilution is not enough as the cells are numerous and would be too crowded to allow

an accurate count to be made, so the blood is drawn up to the 0.2 mark and the diluting fluid as before up to the 101 mark; this produces a dilution of 1 in 500, and the total number of cells in the five squares must be multiplied by 25,000 instead of 10,000 as in the example above

Conversely, in an anæmic blood it is advisable to take blood up to the 1.0 mark; the dilution will be 1 in 100 and the total number of cells

will be multiplied by 5,000.

A table, which will facilitate calculation when blood is taken up to the different marks of the red cell pipette and cells from the five groups of small squares of the Neubauer rulings are counted, is given below :-

TABLE

Blood taken	Dilution	Multiplication factor to arrive at number of cells per c.mm.
0.1 mark	1:1,000	× 50,000
0.2 "	1:500	× 25,000
0.4 "	1:250	× 12,500
0.5 "	1:200	× 10,000
1.0 "	1:100	× 5,000

The Thoma ruling.—The only way this ruling differs from that of the Neubauer is that with the Thoma ruling there are no separate squares for the white cell count, and that there is only one set of rulings instead of two, so that the count cannot be done in duplicate, unless the slide is washed, another drop of diluted blood added, and the coverslip reapplied.

Alternatively, but this does not constitute such a rigid check, a second set of 5 groups of squares can be counted on the same slide, without wash-

ing it and reapplying the coverslip.

As the area of the small square is the same as in the Neubauer hæmocytometer, i.e., 4,000 square millimetre, the calculations are exactly the same as described above.

# (4) Enumeration of leucocytes

For enumeration of the leucocytes, follow the technique given under enumeration of erythrocytes, taking all the same precautions in the

different steps.

With a dry white cell pipette suck blood up to the mark 0.5 (or 1 in cases of leucopænia) wipe off the blood adhering to the outside of the pipette, plunge it into the white cell diluting fluid and draw the mixture up to the mark flat take off the tube and put a tightly-fitting flat rubber band round to close both the ends, and keep it flat on the table keep it flat on the table.

Here, too, the capillary end up to the 1 mark the ninette is converted in converted of the pipette is occupied entirely by the diluting fluid. Hence the fluid. Hence the true dilution of the cells is (or 1) in 10 dec 1 is 22 (or 1) in 10, i.e., 1 in 20 (or 1 in 10).

MARCH, 1940]

By taking blood up to the different marks from 0.1 to 1 in the pipette, dilutions ranging from 1 in 100 to 1 in 10 can be made.

Counting the cells and calculation to find out the cells per c.mm.

With Neubauer ruling .- Count the cells in the four corner areas A, B, C and D.

Divide by 4 to get the average number of cells

in each area. We know the area is 1 square millimetre and

it is 0.1 millimetre deep. Therefore the cubic capacity of each area is

0.1 cubic millimetre  $(1 \times 0.1)$ .

Thus, the cells counted are from 0.1 cubic millimetre of diluted blood.

This, when multiplied by 10, gives the number of cells per cubic millimetre of diluted blood. Again, this figure multiplied by the diluting factor 20 (or 10) gives the number of cells per cubic millimetre of whole blood.

Example.—Blood was taken up to 0.5 mark.

Number of cells counted from

4 squares was 120.

Therefore, the average number of cells in 1 square, i.e., in 0.1 cubic millimetre of diluted blood is 30.

Therefore 300  $(30 \times 10)$  is the number of cells in 1 c.mm. of diluted blood; and 6,000 (300 × 20) is the number of

cells per c.mm. of blood. The number of cells can be calculated rapidly by multiplying the total number of cells from the four squares by  $50(i.e., \frac{20\times10}{4})$  when the dilution is 1 in 20, or by  $25(i.e., \frac{10 \times 10}{4})$  when the dilution is 1 in 10.

Thus in the above example, 120 = number of cells from the 4 squaresTherefore  $120 \times 50 = 6,000$  is the number of cells per c.mm. of blood.

In cases of leukæmia greater dilution of the blood is necessary for a correct count of the cells, as otherwise the cells are so crowded that an accurate count is practically impossible. In such a case, blood is taken up to the 0.1 or 0.2 mark of a white cell pipette (or up to the 0.5 or 1.0 mark of a red cell pipette) and is filled up with white-cell-diluting fuid. The cells are counted from the 4 big squares as in the ordinary leucocyte count and the number of cells per cubic millimetre is calculated.

A table for facilitating calculation when blood is taken up to the different marks of the pipette, and the cells in four areas of 1 square millimetre each are counted, is given below :-

Blood taken	Dilution	Multiplication factor to arrive at number of cells per c.mm.
0.5 in red cell pipet 1.0 "" 0.1 " "" 0.2 " white "" 0.4 " " " 0.5 " " " 1.0 " " " "" "" "" "" "" "" "" "" "" "" ""	te 1:200 1:100 1:100 1:50 1:25 1:20 1:10	× 500 × 250 × 250 × 125 × 62.5 × 50 × 25

### A. With Thoma ruling: calculation for leucocytes

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All the leucocytes in the whole of the crossruled area are counted; as least four separate counts should be made and the average count

This area of 1 square millimetre represents a cubic capacity of 0.1 cubic millimetre. This when multiplied by 10 gives the number of cells per cubic millimetre of diluted blood and when again multiplied by the diluting factor (10 or 20) the number of per cubic millimetre of whole blood.

Thus, the number of cells multiplied by 100 (when the dilution is 1:10) or by 200 (when the dilution is 1:20) gives the number of cells per cubic millimetre of undiluted blood.

## B. Counting by field method for low counts

This method is suitable in kala-azar or other diseases in which there is usually a leucopænia. Take blood up to 0.5 mark of the white cell pipette and dilute it 1 in 20.

With 5 × eyepiece and the objective focus the square in the centre of the field of the counting chamber with the Thoma ruling, or the centre block of the Neubauer, and draw out the tube until the diameter of the field measures eight times the length of the side of a small square. The area of the whole field is now equal to the area of 50 small squares almost exactly  $(\pi \tau^2 = \frac{22}{7} \times 16 = 50.2857)$ .

Count the number of cells in 40 such different

Calculation.—The volume of each square is 1/4,000 cubic millimetre and each field contains 50 squares.

Thus, if the total number of cells in 40 fields is 70, the number of cells per cubic millimetre

of blood = 
$$\frac{4,000 \times 20}{50 \times 40} \times 70$$
$$= 2,800$$

The same result may be obtained by multiplying the total number of cells in 40 fields by 40 if the dilution is 1:20, or by 20 if the dilution is

With this method, cells of a very large area are counted and the multiplying factor is only 40, or 20.

## Enumeration of the nucleated cells of the marrow

The enumeration of the nucleated cells of the marrow from the material obtained by sternal biopsy is carried out in the same way as that of the leucocytes in the leukæmic cases.

## Care of the instruments

After use, the pipettes, coverslip and the hæmocytometer must be cleaned thoroughly.

### Cleaning the pipettes

- Thoroughly wash out all the diluted blood with water.
  - Remove water with absolute alcohol.

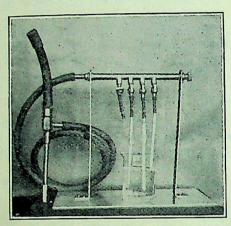
3. Remove alcohol with ether.

4. Pass air through to dry the pipette, so

that the bead rolls freely in the bulb.

It is a very laborious process to clean the pipettes by blowing through them, further, one cannot dry them properly by blowing, as expired air is laden with moisture. The pipettes can be cleaned easily and dried by attaching them to a suction pump (figure 6), or when this is not available by attaching them to a syringe.

Fig. 6.



Suction pump for cleaning pipettes.

If the cells clog the tip or any part of the capillary tube, loosen them by inserting a stiff horse hair.

If there is albuminous matter in the bulb, fill it up either with saturated solution of NaOH or potassium bichromate cleaning solution, keep overnight in the 37°C. incubator, and clean next morning.

Cleaning counting chamber and coverslip

Wash the ruled side of the counting chamber and the coverslip in running water. Thoroughly dry, first with a clean cotton handkerchief and finally with a silk handkerchief or selvyt cloth HOSPITAL ORGANIZATION WITH SPECIAL REFERENCE TO CONDITIONS IN INDIA

By R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.), F.R.C.P. (Lond.)

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The population of British India in 1936 was 281,866,639. The birth-rate and death-rate were 35 per mille and 23 per mille, respectively. The infantile death-rate per 1,000 live births was 162. As against this, in 1937 the birth-rate and death-rate in England and Wales were 14.9 and 12.4 per thousand, respectively, the infantile

or lens paper, but avoid rubbing the ruled area of the counting chamber.

From time to time the counting chamber and the coverslip should be wiped with alcohol or acetone to remove any grease and then dried with the silk handkerchief, but on no account should the counting chamber be immersed or freely cleaned with alcohol.

If the rulings become faint after long use, the lines may be made prominent by lightly rubbing with a silk cloth on which graphite (lead

from a pencil) has been rubbed.

### Normal standards

The number of red cells per c.mm. is usually given in textbooks as 5,000,000. This figure is too low for men and too high for women. The mean of a number of counts in different populations is given in the table.

It will be seen that there is a striking uniformity in the counts in different populations, compared for example with the hæmoglobin estimations in the same range of populations.

### REFERENCE

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These were given in part I (I. M. G., February 1940).

Table showing the normal red cell counts of different populations

	Sec. 2012						
Sex	Age	Locality	Economic status	Number	Mean red cell per c.mm. in millions	Standard deviation	Authority
Males	19-30 25-45 20-45 19-30 19-30 Adults " 16-30 14-38 17-30	Bombay Calcutta  Assam  Cachar U. S. A. Britain  Bombay Calcutta Delhi Cachar Assam Britain  Michigan	Students, etc. Mixed  Coolies  " " Middle class  Middle class  Coolies  " Students	121 50 30 24 20 25  101 125 101 25 20  50	5.110 5.362 5.533 5.353 5.270 5.057 5.400 5.690 5.428 4.470 4.615 4.560 4.454 4.550 4.800 5.012 4.750	± 0.380 ± 0.633 ± 0.490 ± 0.620 ± 0.710 ± 0.563  ± 0.330 ± 0.409 ± 0.250 ± 0.705 ± 0.650	Sokhey et al., 1937. Napier and Das Gupta, 1936.  """ 1935b. "1936. """ 1936.  Napier and Majumdar, 1938. Castle and Minot, 1936. Whitby and Britton, 1939. Price-Jones, 1931. Sokhey et al., 1938. Napier, 1939. Benjamin, 1939. Napier and Majumdar, 1937. Napier and Bilimoria, 1937. Napier and Bilimoria, 1937. Whitby and Britton, 1939. Price-Jones, 1931. Bethel, 1936.

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1935a. 1936. 1935b. 1936. 1938. 36.

, 1938. 1937. 939. mortality was 58 per 1,000. The average yearly deaths for British India for 1927 to 1936 were 6,326,893. The mean mortality figures from the principal diseases were as follows:—

		82,529	
Small-pox ··	• •	52,238	
	• •		
Dysentery and diarrho	ea	249,983	
al-alorg		222,181	
Respiratory diseases		426,725	
Malaria ··		1,506,064	(1934-36)
Malaria · ·			

These figures speak for themselves; there is no need to comment on the conditions prevailing in India. It must not be imagined that conditions have always been satisfactory in Great Britain. In this connection it would be of interest to review the development of the health services in England. England and Scotland throughout the Middle Ages and down to the nineteenth century were periodically ravaged by epidemics of plague, cholera and small-pox. During the period of the 'Black Death', it is estimated that about one-third of the population died of the disease. During a part of the eighteenth century one child out of every three under the age of 5 in Glasgow died of small-pox. The conditions began to improve in the nineteenth century.

In a recent paper in the British Medical Journal (25th February, 1939) the development of the responsibility of the State for public health in England was described. The first Sanitary Commission to investigate the general condition of the health of the labouring population of Great Britain was appointed and Chadwick was the author of the report which became, and has remained ever since, an authoritative presentation of the medical aspects and needs of the social life of the people. It was followed by a long series of public enquiries and Royal Commissions in which medical men played a prominent part. The result was that the state set up a central health organization (formerly the Local Government Board and now the Ministry of Health), divided the country into sanitary districts, and made each district self-governing, on lines laid down by Parliament with reference to sanitation, water-supply, sewage disposal, housing, nuisances, the suppression of the causes of disease, food inspection, and the correct certification of sickness and death; these legislative measures found expression in the Public Health Act of 1875 and four score of subsequent enact-It is significant that as these acts succeeded one another, the measures they instituted became more personal, more direct and more medical and personal, more direct and more medical, so that to-day the public health services administration and their administered by local authorities and their numerous medical officers are concerned, not only with the subject of external environment but with health and disease of the individual, e.g., with industrial hygiene, maternity and infant Welfare, the school medical service, the provision of the Cl of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts, the direct treatment of the Cleansing of Person Acts and the Clean acts and ment of communal diseases (including fevers,

tuberculosis, venereal diseases, rheumatism, blindness and lunacy), the provision of institutions (clinics, hospitals, sanatoria, and special schools for defective children), a health and unemployment insurance system, medical research, the education of the people in health, international sanitary laws, and the imposition of statutory duties on the medical profession on behalf of preventive medicine. How great has been the expansion is indicated by the official report of the Treasury of the fact that in 1900 the nation spent 31 millions on public social services in England and Wales (education, public health, lunacy, poor relief) whilst in 1932, the sum had risen to 430 millions (including insurance and pensions). Here is a gigantic scheme of national, social, and health enterprises for the welfare of the people, and with this scheme the medical profession is now intimately associated as adviser or agent. If India is to solve her pressing medical and public health problems in a satisfactory manner an organization on similar lines to those in Great Britain, but modified with due regard to conditions in India, will have to be set up in the near future.

One of the most important of the many urgent problems in this connection is the provision of adequate hospital accommodation for the people, which is the only way in which expert medical aid can be administered to the people in case of sickness and debility of a serious nature.

A brief reference to the history of origin of hospitals will not be out of place here. In the early days of the Christian era no establishments were founded in Europe for the relief of the sick till the time of Constantine. The connection between monasteries and hospitals became well established between A.D. 1000 and 1050. The Caliph Harun-al-Rashid (A.D. 736–809)

Table I

Average area and population served by each hospital or dispensary

		The second second	
Province	Total number of hospitals and dispensaries in the province	Average area served by each hospital or dispensary (sq. miles)	Average population served by each hos- pital or dispensary
Madras	1,134	126	41,217
Bombay	429	180	41,940
Bengal	1,449	540	34,585
United Provinces	597	178	81,087
Punjab	896	111	26,318
Central Provinces	343	291	45,212
Bihar	528	131	61,310
Delhi	24	24	26,510
Baluchistan	41	1,327	11.305
Ajmer-Merwara	10	271	56,029
The second of the second of			

attached a college to every mosque and to that again a hospital. The Buddhists in India had their hospitals as early as 260 B.C.; Hindustan could then boast of many hospitals founded by

the Emperor Asoka. The one at Surat, made famous by travellers, and considered to have been built under the Emperor's second edict, is still in existence. It will thus be seen that hospitals are by no means a new institution to this country, though the hospitals of Asoka were swept away with the revival of Brahmanism, and a complete hiatus exists between the hospitals he introduced and those that were refounded by the British many centuries later.

Table II

Expenditure on medical relief (per capita and per square mile)

Dinco	Expenditure on medical relief during 1936						
Province	Per capita	Per square mile					
Madras Bombay Bengal United Provinces Punjab C. P. and Berar Bihar Assam Delhi Baluchistan Ajmer-Merwara	Rs. As. P. 0 2 7 0 4 9 0 2 1 0 1 0 0 5 7 0 1 5 0 1 3 0 1 8 1 2 5 0 8 8 0 4 11	Rs. As. P.  53 2 5  65 7 0  84 0 0  29 0 4  51 12 9  13 11 10  35 11 8  14 5 5  1,272 0 0  4 9 9  63 0 10					

It has now been recognized on all hands that hospitalization is essential for the efficient treatment of various diseases. It has been estimated that 4.5 beds for sick and chronic cases per 1,000 of the population are required. In actual practice in more advanced countries this figure ranges from 1.5 in Japan to 5.8 in Sweden.

As regards India, the appended tables illustrate the various points raised herein. These tables have been prepared from the data provided in the *Indian Medical Review* by Major General E. W. C. Bradfield, Director-General, Indian Medical Service (Government of India publication, 1938), a book which contains a mine of information regarding hospitals and dispensaries in India and which has been freely used in this article.

The number of hospitals or dispensaries serving a certain number of people varies widely in India, the figures range from one institution serving 11,305 people in Baluchistan to 81,087 people in the United Provinces. The expenditure on medical relief during 1936 varied from one anna per capita in the U. P. to Rs. 1-2-5 per capita in Delhi. England spent £2-14-9 per head on health services in 1927. According to the Chief Medical Officer of the Ministry of Health there were 1,846 hospitals with 215,450 beds in England and Wales in 1933, exclusive of mental institutions and fever hospitals. The number of beds per 1,000 of the population was therefore roughly 5.3. There were 88,691 beds

in the various hospitals of British India in 1937 (vide Table III). That the number of hospital beds per thousand of population was about 0.3, including fever hospitals and mental institutions, shows how important and urgent the problem of increase of hospital accommodation is to the country.

Out of the total number of 10,269 doctors (vide table IV) attached to various hospitals and dispensaries in British India, only 8,786 were stipendiary. Out of the total strength of 9,746 of the nursing staff (vide table V), there were only 6,317 nurses (including matrons, assistant matrons, sisters, staff nurses and probationers) to look after 88,691 beds, i.e., 14 cases per nurse for 24 hours.

There is an undoubted and pressing need for improvement in the situation but how can this be effected. Hospitals, including dispensaries, can be run by several authorities acting more or less independently or in concert, viz, the State, the local authorities such as municipal bodies, and voluntary organizations. There is a tendency in India to expect the state to do everything, but even in Great Britain and other rich countries, such as the United States of America, the state is not able to shoulder the whole burden. The State already provides 39 per cent of the beds in the hospitals of British India, the figure being 60 to 100 per cent in some Provinces.

The British Medical Association has reviewed the whole position in England and made its recommendations. The Association recognizing that hospital accommodation in any given area may be provided by voluntary bodies or by statutory authorities or by any combination of these, believes that the continuance of voluntary hospitals in England is in the public interest. By reason of the Local Government Act 1929, there has been from April 1930 onward development of hospital services by local authorities. It is laid down in the Local Government Act 1929 that the local authority must recover (the position being slightly different in Scotland) from every hospital patient (save in the case of infectious diseases) the whole of the expense incurred in the maintenance and treatment of such patients, or, if the authority be satisfied that the person cannot reasonably pay the whole, then such part as that authority decides he, or she, is able to pay. The local authority may, however, by agreement with any association of fund (such as a hospital saving association or contributory fund) accept an agreed sum for the hospital expenses in respect of any member thereof. An extensive development of contributory schemes for hospital benefit should result from this. For a relatively small periodic contributions tribution to such a fund, the payment of hospital expenses in time of illness can be insured against, and the patient or the person liable to maintain the patient will not then be called upon to meet the demand of the the demand of the local authority for payment of the whole expense, either at once or in a series of instalments. of instalments, during and after the illness, when

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series when the financial capacity to pay is least. Complete co-operation of a voluntary and a council (municipal) hospital in an area will necessitate dealing with the question of patients' payments in

the area offers the simplest and most satisfactory method; it relieves the patient from irksome enquiries and financial stress at the time of the illness, lessens the administrative work of the

TABLE III

Total number of beds in hospitals in various provinces of British India run by the State and other authorities

Province	Government	Municipal or District Board	Missionary	Private	Total	Percentage, Government
Madras Bombay Bengal United Provinces Punjab Bihar C. P. and Berar Assam Sind Orissa Delhi NW. F. Province Baluchistan Ajmer-Merwara Coorg Central India Agency	8,898 4,612 3,845 3,437 4,768 2,657 1,478 1,939 787 616 462 591 541 244 160 64	1,312 2,821 2,314 4,677 7,080 2,566 1,476 507 657 581 216 676 0 0	5,494 2,409 1,132 957 1,647 1,061 1,838 435 78 114 140 377 0 0	501 2,289 3,037 2,148 835 1,625 577 331 358 283 528 73 49 0 0 0 362	16,205 12,131 10,328 11,219 14,330 7,909 5,349 3,212 1,880 1,594 1,346 1,717 590 244 174 463	54 38 37 30 33 33 25 60 41 38 34 91 100 92 13
TOTAL	35,099	24,934	15,682	12,976	88,691	39% (average)

a similar way in both institutions. In both the voluntary and council hospitals the worker and his dependents must be asked to pay the maintenance and treatment charges appropriate to

hospital, and in the case of voluntary hospitals will solve the financial difficulties which beset so many hospitals in large industrial communities. Persons insured under the National Health

TABLE IV
The total number of doctors employed in various hospitals in British India

Province	HOSPITALS WITH IN-PATIENTS		Hospitals without beds		
	Stipendiary	Honorary	Stipendiary	Honorary	Total
Madras Bombay Bengal United Provinces Punjab Bihar C. P. and Berar NW. F. Province Assam Sind Drissa Baluchistan Ajmer-Merwara Coorg Central India Agency Delhi	931 762 570 666 1,101 368 375 87 155 124 193 49 16 10 28	398 389 417 104 26 40 38 1 1 11 5 0 0 3 7 17	808 132 1,231 87 119 370 101 34 247 21 98 0 2 8 0 9	9 4 0 3 1 0 3 2 0 1 0 0 0 0 0 3	2,146 1,287 2,218 860 1,247 778 517 124 403 157 296 49 18 21 35 113
Total	5,519	1,457	3,267	26	10,269
6,976		3,293			

alike for the prospective patient and for the hospital, an agreed payment under a contributory scheme organized by a responsible committee in

Insurance Acts, and other persons below an agreed income, may be accepted for hospital treatment as contributing patients on a contributory scheme or on individual payment, or

TABLE V Total number of nurses and midwives employed in the various hospitals of British India

	Hospitals with in-patients		Hospitals and dispensaries with out-patients only				
Province	Nurses	Midwives	Male nurses	Nurses	Midwives	Male nurses	Total
Madras Bombay Bengal United Provinces Punjab Bihar C. P. and Berar Assam Sind Orissa Delhi N-W. F. Province Baluchistan Ajmer-Merwara Coorg Central India Agency	1,641 1,308 860 439 651 300 381 201 106 70 247 56 4 17 0 36	640 388 122 84 331 123 110 65 74 81 20 3 9 4 1	73 111 77 65 47 28 30 16 0 9 2 94 78 23 0 2	1 13 5 4 8 0 0 1 0 3 1 3 0 0 0 1 0 0	505 28 7 2 1 8 12 2 1 16 0 0 6 0	38 7 0 1 0 0 0 1 0 0 1 9 0 2 1 2 0 0	2,898 1,855 1,071 595 1,038 459 535 284 184 196 272 156 92 47 7 57
TOTAL	6,317	2,074	655	40	589	71	9,746
And the second	9,046				700		

under a financial arrangement made with public authorities, approved societies, employers of labour, insurance companies, and others. The great majority, probably 80 to 85 per cent of all hospital patients, can thus be dealt with and the hospital services can be adequately financed by one or other of these methods. All persons above the agreed income limit should be regarded as private patients and should be prepared to meet the special charges for maintenance and medical services appropriate to that class. Such persons do not normally constitute more than 5 per cent of applicants for hospital service.

A 'clearing house' (i.e., a central bureau) to co-ordinate the distribution of cases requiring admission to the various hospitals and to provide information as to where and when special forms of treatment and other forms of diagnostic help are available, would be desirable under a system of co-ordination of grouped hospitals. It should also co-ordinate the hospital ambulance transport of the area.

In the year 1937, the number of insured persons entitled to the benefit of the Insurance Medical Services in England and Wales was 17,032,000, an increase of 712,000 on that for 1936, while the number of insurance practitioners was 16,800, an increase of 50.

The only way in which India can hope to solve the question of the extreme paucity of the accommodation available inhabitants is to develop and finance its hospitals somewhat on the lines on which it is being done in Great Britain and other advanced countries of the world. Now that the old prejudice against hospital treatment is disappearing rapidly and the people are beginning to understand that when one is really ill there is no place better than the ward of a good hospital, there should be no difficulty about it. The only thing which is militating against the hospitals at the present time is the unsatisfactory manner in which many of these institutions are being run, all over the country. I have no doubt that the development of a contributory scheme for hospital benefit in India will succeed and is in fact the only way in which the hospitals can be made efficient with regard to their personnel, equipment and the required number of beds per thousand of population ensured. The state in this country is already doing a great deal towards supplying the hospital accommodation It makes large grants-in-aid to private medical institutions, local boards and municipalities. Although the amount is substantial, yet it cannot meet the needs of the country. It is not possible for the state to make more contributions without any increase in taxation. Under the circumstances what should be developed further is the voluntary and municipal hospitals. The local authority provides as many as 124,169 beds in general hospitals in England.

The voluntary hospitals can derive their funds

from the following sources: (a) Gratuitous contributions, i.e., contributions tions from whatever source to which no such conditions are attached (either expressly or by implication) as would involve obligation of service on the next service on the next service of service on the next service on the next service of service on the next service of the next vice on the part of the hospital, but are charitable contribution itable contributions to be expended at the discretion of those to cretion of those to whom the management of the hospital is entrusted.

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(b) Contributions for services rendered, or to be rendered, i.e., contributions for hospital benefit made either by patients themselves or on their behalf by individuals or associations, or, in case of local authorities, payment made for the maintenance and medical treatment of patients for whom these authorities are responsible.

Persons applying for free treatment in such hospital service will have to be certified by the almoner or other officer of the hospital as unable to contribute in any way towards their maintenance and medical treatment. Only then will the hospital benefit be provided by the gratuitous contributions placed at the discretion of the hospital authorities and by the gratuitous

services of the visiting medical staffs.

The contributory system has already been introduced in a rudimentary form in many of the provinces in India, though Bengal has not yet taken it up. Poor and indigent patients, both indoor and outdoor, are given free medical and surgical treatment in all provinces in India. They are not charged any fees, nor are they required to pay for any special treatment, or for drugs not ordinarily available at the hospital. Patients whose monthly income does not exceed Rs. 30 p.m. in Madras and Bombay, Rs. 150 in ore Punjab, Rs. 100 in Delhi, and with an annual income of less than Rs. 2,000 in the United Provinces and Central Provinces fall into the category of those who are exempted from hospital fees.

In the case of persons employed in factories, mines, quarries, tea estates and railways in Madras, Bombay and Sind, if admitted as inpatients at the instance of their employers, a charge of As. 8 is levied from the employers, but if they attend government hospitals of their own accord they are treated as members of the general public for purposes of hospital charges.

In the Central Provinces and Berar the system of charging a fee of two pice to each new patient, except paupers, attending a hospital or dispensary had been in force since 1933. The amounts received on that account in most cases were insignificant and with a few exceptions there had been an undoubted fall in the outpatients' attendance. It was thought that if the system were conscientiously worked out it was bound to lead to a 'set-back' to the popularity of scientific medicine and the local government therefore allowed its discontinuance in the year

In the North-West Frontier Province an innovation of interest has been the starting of paisa, dispensary, where everybody is required to pay one pice for the day's medicine supplied, and the income thus derived goes towards the running expenses of the dispensary. The success of this dispensery of of this dispensary has led to the opening of similar ones elsewhere.

India could with advantage copy the system followed by certain countries on the continent of Europe. The plan pursued is to demand

payment from all patients who are admitted to the hospital under a scale of charges divided into three or four grades. The first grade pays a substantial sum and obtains anything or everything the patient may care to have or pay for, subject to the control of the medical attendant. The second pays much less, but a remunerative rate for all they receive at the hospital, and the third and fourth classes are very poor people or paupers, who are paid for on a graduated scale by the municipalities or corporations. The local authorities can levy a medical cess based on the amount of rent paid. Under this system wellto-do thrifty artisans and improvident paupers are all treated by one staff, controlled by one administration, and are located in immediate proximity to each other though in separate pavilions. This plan should be accompanied by a system of health insurance, whereby all classes who desire to be thrifty pay a small annual premium in the days of health, and secure adequate hospital treatment and care when ill. The details of the insurance scheme can be easily worked out by an expert committee. The state can be moved to enact the appropriate laws.

A complaint frequently made against the administration of Indian hospitals is that large numbers of patients who can really afford to pay are treated free of charge. The problem is not simple, because modern scientific medicine is costly, and, although a person may not be indigent as regards the ordinary necessities of life, he is often unable to pay for even minimum requirements when sick. In the absence of an almoner system, hospital abuse is not easy to detect, but is probably less common than is frequently suggested. The increasing employment of honorary medical officers in hospital outpatients departments will probably be a useful corrective, since the final decision as to the patient's eligibility for free treatment rests largely with the doctor.

In order to obtain more funds for the running of hospitals, an almoner system should be instituted in the existing medical institutions. The extension of hospital facilities must depend on a demand from the public. It is for the state to act as a co-ordinating agent between the

state, municipal and voluntary hospitals.

### BRITISH PHARMACEUTICAL PRODUCTS

Two lists of pharmaceutical products that are made in the United Kingdom are given below; in the first table are included those products which have essentially the same chemical composition as some well-known drugs of foreign, but not necessarily enemy-country, manufacture. The second table gives the drugs which have a similar therapeutic action to those mentioned in the foreign list. Many of the products included in the foreign list will be available in India and some of the British products may not, on account of the restriction in exports at present in force in Great Britain.

It is not claimed that the list is comprehensive, either in the matter of the drugs mentioned or in the names of the manufacturers.

The star (\*) placed against some of the names of foreign products indicates that these products are now also manufactured in Great Britain.

### TABLE I

Showing foreign products of which there are British products with the same essential composition.

composition.			
Foreign product	British product	British maker and/or supplier	
Acecoline Acidol pepsin	Acetylcholine chloride Betaine hydrochloride and pepsin.	B. D. H.; B. W.; Evans. Boots; B. D. H.; Evans.	
Adalin Afenil Agurin	Carbromal B. P. Calcium chloride and urea Theobromine and sodium	A. & H.; Boots; B. D. H.; Evans; M. & B. B. D. H.; Evans. Boots; B. D. H.; Evans; M. & B.; Whiffen.	
Airol Aluoin	acetate.  Bismuth oxyiodogallate Diamorphine	Boots; B. D. H.; B. W.; Evans; M. & B.; Whiffen, M. & B.	
Alypin Anæsthesin * Antiphlogistine	Amydricaine hydrochloride Benzocaine B. P. Kaolin poultice B. P.	Evans. A. & H.; Boots; B. D. H.; Evans. A. & H.; Boots; B. D. H.; Evans.	
(Denver). Aperitol Aphrodine	Phenolphthalein B. P. Yohimbine	A. & H.; Boots; B. D. H.; Evans; M. & B. B. D. H.; Evans.	
Argyrol Aristol	Silver vitellin Thymol iodide	Boots; B. D. H.; Evans; M. & B. A. & H.; Boots; B. D. H.; Evans; Howards; M. & B.; Whiffen.	
Arrhenal Atocin Atophan	Disodium methylarsenate Cinchophen B. P. Cinchophen B. P.	B. D. H.; Evans. A. & H.; Boots; B. D. H.; B. W.; Evans; Howards. A. & H.; Boots; B. D. H.; B. W.; Evans; Howards. Howards.	
Atophan balsam Atoxyl  * Aurobin (Richter)	Ung. agotan co. Soamin Sodium arsenilate Crisalbine	B. W. Evans; M. & B. M. & B.	
Bayer 205 Betaxin	Antrypol Vitamin $B_1$ Berin	B. D. H. A. & H.; B. D. H.; B. W.; Evans; Glaxo; M. & B. Glaxo.	
Bismogenol	Injection bismuth salicylate B. P.		
Bismosalvan	Quinine iodobismuthate Quinostab Rubyl	A. & H.; B. D. H.; Evans; Whiffen.  Boots.  M. & B.	
Bitaemaine Bromural Calcium diuretin	Benzamine Dormigene Theobromine calcium salicylate	Boots; B. D. H.; B. W.; Evans. A. & H. Boots; Evans; Whiffen.	
* Calsoid Cantan	Calcium o-iodoxybenzoate Arthrytin Ascorbic acid B. P. (vitamin	Whiffen. M. & B. A. & H.; Boots; B. D. H.; B. W.; Evans; Glaxo.	
er ithe trans	C). Celin Planavit C	Glaxo. M. & B.	
Cardiazol Chinosol	Phrenazol Potassium hydroxy-quinoline sulphate.	Boots. A. & H.; Boots; B. D. H.; Evans.	
Chloretone Coramine (Ciba)	Soloid chinosol Chlorbutol B. P. Anacardone	B. W. A. & H.; Boots; B. D. H.; Evans; M. & B. B. D. H.	
Creosotal Dermatol Devegan	Nicamide Creosote carbonate Bismuth subgallate	B. W. Boots; B. D. H.; Evans. A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.	
* Dial (Ciba) Digitaline Nativelle	Acetarsol vaginal compound Stovarsol vaginal compound Allobarbitone Digitalin granules Digitoxin	Evans.  M. & B.  A. & H.; Boots; B. D. H.; Evans.  A. & H.; Boots; B. D. H.; Evans.  Boots.	
Dionin Diuretin	Tabloid digitalin cryst Ethylmorphine hydrochloride Theobromide and sodium sali-	B. W. A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.	
Duotal Esterol Eugallol	cylate B. P. Guaiacol carbonate Benzyl succinate Proceedings	A. & H.; B. D. H.; B. W.; Evans; M. & B. A. & H.; B. D. H.; Evans.	
Euphthalmine	Pyrogallol monoacetate Tabloid ophthalmic euphthal mine hydrochloride.	B. D. H.; Evans. B. W.	

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### TABLE I-contd.

Foreign product	British product	British maker and/or supplier
	Quinine ethyl carbonate B. P.	A & H : Boots: B D H D W
Euquinine Euresol	Resorcin monoacetate	A. & H.: Boots: B D H. Evans; Howards.
Exalgin	Methylacetanilide	A. & H.: Boots: B D H · Evens
Ferronyl	Citrated ferrous chloride B. P.	A. W. H., D. D. H. B. W. Frong, House J.
Fibrolysin	Thyosinamine sodium salicy-late.	Boots, B. D. H.; Evans, Howards.
Germanin	Antrypol	В. D. H.
Helmitol	Formamol	A. & H.: B. D. H. Evans
Hydropyrin	Lithium acetyl-salicylate	A. & H.: Boots: B D H · Fuence Hammed
Hypophysin	Pituitary extract B. P. Ichthammol B. P.	Tr. W. L., Dools, D. D. H. B. W. Brance Clare
Ichthyol Iod-calcium diuretin	Potassium iodide and theo-	
Tou-carefulli diareoni	bromine calcium salicylate.	Whiteh.
Iodeikon	Iodophthalein B. P.	A. & H.; B. D. H.; Evans.
	Stipolac	B. W.
Iodipin	Opacol. opacin Iodized oil B. P.	M. & B.
Tourpin	Iodatol	A. & H.; Evans. B. D. H.
	Neo-hydriol	M. & B.
. Iod-tetragnost	Iodophthalein B. P.	A. & H.; B. D. H.: Evans.
	Stipolac Opacol. opacin	B. W.
* Kalmopyrin (Richter)	Calcium acetyl-salicylate	M. & B.
*Larostidine (Roche)	Histidine	A. & H.; Boots; B. D. H.; Evans; Howards. A. & H.; B. D. H.; B. W.; Evans.
Lenigallol	Stellidin	M. & B.
Lipiodol	Pyrogallol tri-acetate Oleum iodisatum B. P.	B. D. H.; Evans.
	Neo-hydriol	A. & H.; Boots; B. D. H.; Evans. M. & B.
Luminal	Iodatol (iodized oil 40%)	B. D. H.
2 dilliniai	Phenobarbitone B. P. Gardenal	A. & H.; Boots; B. D. H.; Evans; M. & B.
	Tabloid phenobarbitone	M. & B.
Luminal sodium	Soluble phenobarbitone B P	B. W.
	Gardenal sodium	A. & H.; Boots; B. D. H.; Evans; M. & B. M. & B.
Magnesium perhydrol	Tabloid soluble phenobarbitone	
Medinal	Magnesium peroxide Soluble barbitone B. P.	A. & H.; Boots; B. D. H.; Evans; M. & B.
Migrainin	Tabloid soluble barbitone	A. & H.; Boots; B. D. H.; Evans; M. & B. B. W.
Myosalvarsan	Phenazone caffeine citrate	A. & H.; Boots; B. D. H.; Evans; M. & B.
	Sulpharsphenamine B. P. Sulphostab	Boots; B. W.; Evans; M. & B.
	Kharsulphan	Boots.
Naganol	M. A. B.	B. W. M. & B.
Neocaine	Antrypol	B. D. H.
	Procaine hydrochloride B. P. Arecan	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.
Neohydropyrin	Planocaine	Evans. M. & B.
	Magnesium acetyl-salicylate	B. D. H.; Evans.
Neosalvarsan	Magsyn	A. & H.
	riovangan	A. & H.; Boots; B. W.; Evans; M. & B.
	Novostab	A. & H. Boots.
No. 1	Neokharsivan	B. W.
Neo-trepol	N. A. B.	M. & B.
		A. & H.; Boots; B. D. H.; Evans; M. & B.
Nr.	Hypoloid bismuth metal	Boots, B. W.
Novocain	Bisglucol	M. & B.
*Omnones (7	Planacine hydrochloride B. P.	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.
*Omnopon (Roche)	Panaranal	M. & B.
Urthofor	Alopon	B. D. H.; Evans. A. & H.
Pauliavin tableta	Distribution B. P.	A. & H.; Boots: B. D. H.; Evans: M. & B.
РОЦ	Danasas	M. & B.
Parathormone	Alopon	B. D. H.; Evans. A. & H.
Pentanel	Parathyroid extract	Evans.
Pentnucleotide	Euparatone	А. & Н.
	SDNT	A. & H.
costu	Hydrogen peroxide 100 vols. A	Evans. A. & H.; Boots; B. D. H.; Evans; M. & B.
		B. D. H.; B. W.; Evans; Glaxo.

# TABLE I—concld.

TABLE 1—concta.			
Foreign product	British product	British maker and/or supplier	
Progynon		Boots. B. D. H.	
	Œstrinum	Evans. Boots.	
Prolan	Antostab	Boots. B. D. H.	
Proluton	Luteostab	Boots. B. D. H.	
Prontosil album	Sulphanilamide	A. & H.; Boots; B. D. H.; B. W.; Glaxo; M. & B.	
Protargol	Silverproteinate B. P.	Evans. A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.	
Pyoktanin violet	Methyl violet	A. & H.; Boots; B. D. H.; Evans. B. D. H.	
Pyoktanin yellow Pyramidon	Amidopyrine B. P. Tabloid amidopyrine	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B. B. W.	
Pyramidon salicylate	Amidopyrine salicylate	A. & H.; B. D. H.; Evans; M. & B. A. & H.; B. D. H.; Evans.	
Salipyrin Salit	Phenazone salicylate Bornyl salicylate	A. & H.; Boots; B. D. H.; B. W.; Evans.	
Salyrgan Sanocrysin	Injection mersalyl B. P. Crisalbine	M. & B.	
Selvarol	Calcium gluconate B. P.	A. & H.; Boots; B. D. H.; B. W.; Evans; Howards; M. & B.	
Sionon Spirobismol	Sorbitol Quinine iodobismuthate	A. & H.; B. D. H.; Howards; M. & B. A. & H.; B. D. H.; Evans; Whiffen.	
Spirobismoi	Quinostab Rubyl	Boots. M. & B.	
Spirocid	Acetarsol B. P. Orarsan	Evans. Boots.	
	Kharophen Stovarsol	B. W. M. & B.	
Stypticin	Cotarnine hydrochloride	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B. A. & H.; Boots; B. D. H.; Evans; M. & B.	
Styptol Styracol	Cotarnine phthalate Guaiacol cinnamate	B. D. H.; Evans; M. & B.	
* Sulfarsenol	Sulpharsphenamine B. P. Sulphostab	Boots; B. W.; Evans; M. & B. Boots.	
	Kharsulphan M. A. B.	B. W. M. & B.	
Superol .	Potassium hydroxy quinoline sulphate.		
C	Soloid chinosol Adenaline B. P.	B. W. A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.	
Suprarenin Tannalbin	Albumin tannate Acetannin	A. & H.; B. D. H.; Evans; M. & B. A. & H.; B. D. H.; Evans; M. & B.	
Tannigen Tannoform	Mothylana ditannin	B D H · Evans: M. & B.	
Theorin sodium acetate	tate D. F.	Boots; B. D. H.; Evans; M. & B.	
Theominal	barbitone B. P.	A. & H.; Boots; B. D. H.; Evans.	
Thiocol	Theogardenal Potassium guaiacol sulphonate	M. & B. A. & H.; B. D. H.; Evans.	
Tiodine	Thiosinamine ethyliodide Iodolysin	Boots; B. D. H.; Evans; Glaxo; M. & B.	
Trikresol Trional	Cresol B. P. Methylsulphonal B. P.	A. & H.; Boots; B. D. H.; Evans; M. & B. A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.	
Unden	Œstroform Ovostab	Boots	
Urotropin	Hexamine B. P. Hypertonic solution sodium	A. & H.; Boots; B. D. H.; B. W.; Evans.	
Varicophytin	chloride with anæsthetic.		
*Veganin (Warner)	Aspirin, phenacetin and code- ine phosphate.		
Veronal	Barbitone B. P. Tabloid barbitone	A. & H.; Boots; B. D. H.; Evans; M. & B. B. W.	
Veronal sodium	Soluble barbitone B. P. Tabloid soluble barbitone	Boots; B. D. H.; Evans; M. & B. B. W.	
Vigantol	Liq. calciferol B. P. Viosterol	A. & H.; Boots; B. D. H.; Evans; Glaxo. A. & H.	
	Radiostol solution and pellets Ostelin		
Xeroform	Bismuth tribromphenate	B. D. H. Glaxo. A. & H.; Boots; B. D. H.; Evans; Howards; M. & B. Whiffen.	
Yatren	Chiniofon B. P.	B. D. H.; Evans.	
	Quinoxyl Quiniosulphan	B. W. M. & B.	
Zinc perhydrol	Zinc peroxide	B. D. H.; Evans.	

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### TABLE II

Showing foreign products of which there are British products that have the same therapeutic properties

Foreign product	British product	British maker and/or supplier
Albargin	Silverproteinate B. P.	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B. A. & H.; Boots; B. D. H.; Evans.
Algodorm	tablets B. P. C.	
Allochrysine Antileprol	Myocrisin Moogrol. Iodized moogrol Alepol.	M. & B. B. W.
	Ethyl chaulmoograte Ethyl esters of hydnocarpus	B. D. H. B. D. H.; Evans.
	oil B. P. Cincophen and aspirin	Boots; B. D. H.; Evans.
Arcanol Aristochin	Quinine ethyl carbonate B. P	
Arrhenal Arsen-triferrin	Soamin Iron and arsenic ampoules	
Aspiphenin	and/or tablets. Aspirin and phenacetin	A. & H.; Boots; B. D. H.; B. W.; Evans; Howards.
Asthmolysin	Pituitary extract and adre- naline.	A. & H.; Boots; B. D. H.; Evans.
Atophan balsam	Analgesic balm	Evans. B. D. H
	Analgesic cream (vanishing) Regesan pain relieving balm	Boots.
Atanhourd	Menthofax Cinchophen and sodium sali-	B. W.
Atophanyl	cylate.	
Bioferrol	Hepol with iron Livron	A. & H. Boots.
	Heprona. Hepatex with iron	Evans.
Bismarsen Bismogenol	Biarsamide. Bistovol Bisantol	M. & B M. & B.
Bivatol	Stabismol	Boots.
Bromural	Neo-cardyl Carbromal B. P.	M. & B. Boots; B. D. H.; Evans; M. & B.
Cafaspin	Aspirin and caffeine	A. & H.; Boots; B. D. H.; B W.; Evans; Howards.
Calcimint	Calsolact Calsimil	A. & H. B. D. H
	Salpern	Boots.
Calcium diuretin	Kalsolac Ostocalcium	Evans.
Calcium (Sandoz)	Theobromine and sodium	A. & H.; Boots; B. D. H.; Evans; M. & B.; Whiffen.
(bandoz)	salicylate B. P. Calcium gluconate B. P.	A. & H.; Boots; B. D. H.; Evans; Howards; M. & B.
0	Percalcin. Levu-calcin (calcium lævul-	Evans.
Calsiod Campolon	inate) ampoules.	
polon	Calcium acetyl-salicylate Hepol. Anaphepol. Azoule	Boots; B. D. H.
	liver extract.	
<b>一种原理</b>	Hepastab. Hepastab No. 2 Anhæmin. Liver extract	Boots. B. D. H.
	(intramuscular injection).	
Carboserin	Hepatex comp. H. C. I. Examen	Evans Glaxo.
Cardiazol	Activated carbon	A. & H.; Boots; B. D. H.; Evans.
	Charcoal and kaolin Anacardone	Boots; Evans. B. D. H.
Cash:	Nicamide Cardatone For use as	B. W.
Casbis	Dacorene stimulant.	Evans M. & b.
	Injection bismuth salicylate B. P.	A. & H.; B. D. H.; Evans.
C:	Stabismol	Boots.
Cignolin Cito-baryum	Neo-cardyl Bisantol	M. & B M. & B
Jaryum	Chrysarobin B. P.	A. & H.: Boots: B. D. H.: B. W.: Evans: M. & B
	Barium meal Novumbrose. Umbrose	Boots; Glaxo A. & H.
	Shadoform	B. D. F
0		B. W Evans.
Codeonal Compral	milko.	
-dhta1	Soluble barbitone and codeine Amidopyrine B. P.	Boots; B. D. H.; Evans. Boots; B. D. H.; B. W.; Evans.

# TABLE II—contd.

	TABLE II	-conta.
Foreign product	British product	British maker and/or supplier
Coramine (Ciba)	Cardatone	Evans.
	Dacorene Phenylsemicarbazide	M. & B. B. D. H.; Evans; M. & B.
Cryogenine Cycloform	Benzocaine B. P.	A. & H.; Boots; B. D. H.; Evans.
Cycloform ointment	Benzocaine, extract of hæma- melis and zinc oxide oint-	B. D. H.
	ment.	
Cylotropin	Ung. hæmamelis co. Evans Hexamine, sodium salicylate, and caffeine.	Evans. B. D. H.; Evans.
Digipuratum	Digitalin granules Tab. digitalis leaf B. P.	A. & H.; Boots; B. D. H.; Evans. A. & H.; Boots; B. D. H.; Evans.
Digitaline Nativelle	Diginutin. Digoxin Tabloid digoxin	B. W. B. W.
Dijodyl	Iodoprotein	Boots.
	Iodicin Iodocasein	B. W. Whiffen.
Eldoform	Albumin tannate	B. D. H.; Evans; M. & B.
Elityran	Thyroxine sodium B. P. Thyroid B. P.	Boots; B. D. H.; B. W.; Evans. A. & H.; Boots; B. D. H.; B. W.; Evans.
Elixir Gabail	Tabloid thyroxine Elixir bromovalerianate	B. W.
Elixir Gabali	Euvalerol B	Boots; Evans. A. & H.
Ephetonin	Elixir valibrom B. D. H. Ephedrine hydrochloride	B. D. H. A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.
Esmodil	Acetylcholine	B. D. H.; Evans.
	Hypoloid acetylcholine bro- mide.	B. W.
Euphthalmine	Pragmoline Atropine sulphate B. P.	M. & B. A. & H.; Boots; B. D. H.; B. W.; Evans; Whiffen.
	Homatropine hydrobromide	A. & H.; Boots; B. D. H.; B. W.; Evans, Whitell.
Fæxalin Fæxin	Dried brewer's yeast	A. & H.; Boots; B. D. H.; Evans.
Femergin	Ergotoxine ethane sulphonate B. P.	B. D. H.; B. W.; Evans; M. & B.
Ferronyl	Ferosan	Boots.
Fibrolysin	Fersolate Iodolysin	Glaxo. A. & H.
Gonosan	Thiosinamine ethyl iodide Sandalwood oil and kava-	Boots; B. D. H.; Evans; Glaxo. B. D. H.; Evans.
Gonosan	kava resin.	
	Kavol Savaresse's santal	A. & H. Evans.
Gravitol		A. & H.; Boots; B. D. H.; B. W.; Evans; Glaxo.
	Ergometrine B. P.	A. & H.; B. D. H.; B. W.; Evans; M. & B.
	Erbolin Ernutin	Glaxo. B. W.
Hegonon Helmitol	Silver proteinate B. P. Cystazol	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.
Hepatopson liq.	Liquid extract of liver B. P.	A. & H. A. & H.; Boots; B. D. H.; B. W.; Evans.
	Hepol Hepatex	A. & H. Evans.
Hexal	Compound extract of liver Hexamine B. P.	Boots.
Hexophan	Cinchophen B. P.	A. & H.; Boots; B. W.; B. D. H.; Evans; M. & B. A. & H.; Boots; B. D. H.; B. W.; Evans; Howards;
Hypertherman	T. A. B. vaccine B. P.	B. D. H.; B. W.; Evans; Glaxo.
Ichthalbin	Normal horse serum Ichthammol B. P.	A. & H.; B. W.; Evans. A. & H.; Boots; B. D. H.; Evans.
Impletol	Procaine hydrochloride and caffeine.	B. D. H.
Introduc	Arecan spinal anæsthetic	Evans.
Inkretan	Thyroid and pituitary Thyrosex	Boots; B. D. H. Evans.
Iod-calcium-diuretin	Potassium iodide and theo- bromine sodium salicylate.	Boots; B. D. H.; Evans; Whiffen.
Iodival	Iodoprotein Iodocasein	Boots. Whiffen.
Juvenin	Yohimbine, nuxvomica and damiana pills.	B. D. H.
Keraphen	Damiana pills Iodophthalein B. P.	Evans. A. & H.; B. D. H.; Evans.
	Stipolac	B. W.
	Opacol. Opacin	M. & B.

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## TABLE II—contd.

Foreign product	British product	British maker and/or supplier
	Crisalbine. Myocrisin	M. & B.
Krysolgan	Adenosine	B. D. H.
Lacarnol	Crisalbine. Myocrisin	M. & B.
Lopion	Neoarsphenamine B. P.	Boots; B. W.; Evans; M. & B.
Mapharsen	Novostab	Boots.
	Neokharsiyan	B. W.
	Halarsol. N. A. B.	M. & B.
Matronax	Ovary and thyroid	Boots; B. D. H.; Evans.
	Thyro-varium	B. W.
Neo-oleosal	Injection bismuth salicylat B. P.	e A. & H.; B. D. H.; Evans.
	Stabismol Stabismol	Boots.
	Neo-cardyl	M. & B.
Mar weergen	Silver proteinate B. P.	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.
Neo-reargon	Soloid silver proteinate	B. W.
Neostibosan	Neostam	B. W.
Neutralon	Magnesium trisilicate	A. & H.; Boots; B. D. H.; M. & B.
	Colloidal kaolin	B. D. H.; Evans.
	Osmo-kaolin	A. & H.
	Collumina. Novasorb	Evans.
Noctal	Phenobarbitone B. P. Gardenal	A. & H.; Boots; B. D. H.; Evans; M. & B. M. & B.
	Tabloid phenobarbitone	B. W.
	Soneryl	M. & B.
Novalgin	Amidopyrine B. P.	A. & H.; Boots; B. D. H.; B. W.; Evans.
	Sonalgin	M. & B.
	Amidopyrine salicylate	B. D. H.; Evans.
Novasurol	Injection mersalyl B. P.	A. & H.; Boots; B. D. H.; Evans.
Novetenber	Neptal	M. & B.
Novatophan	Cinchophen B. P.	A. & H.; Boots; B. D. H.; B. W.; Evans; Howards;
Novocain	Arecan	M. & B. Evans.
Omnadin	T. A. B. vaccine B. P.	B. D. H.; B. W.; Evans; Glaxo.
	Normal horse serum	A & H · B. W.: Evans.
Pandigal	Digitalin	A. & H.; Boots; B. D. H.; B. W.; Evans.
Panflavin	Digoxin	B W
Pantocain	Euflavine	A. & H.; Boots; B. D. H.; Evans; M. & B.
	Procaine hydrochloride B. P. Beta-borocaine	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.
	Arecan anæsthetics	B. D. H. Evans.
D. 111.	Planocaine	M. & B.
Pellidol Phanodorm	Scarlet red ointment	A. & H.; Boots; B. D. H.; Evans; M. & B.
пацоцогт	Allobarbitone	Boots; B. D. H.; Evans.
Progynon	Soneryl	M. & B.
	Stilbæstrol Clinestrol	A. & H.; Boots; B. D. H.; Glaxo.
Prolan	Ext. pituitary anterior lobe	Glaxo.
Proluton	Corpus luteum	Evans. A. & H.; Evans.
Prominal	Phenobarbitone B. P.	A. & H.; Boots; B. D. H.; Evans.
	Solantoin (for epilepsy)	Glaxo.
	Rutonal	M. & B.
Promonta	Tabloid phenobarbitone	B. W.
	Casein glycerophosphate Bynogen	Boots; B. D. H.; Evans; M. & B.
	Lecigen	A. & H. Evans.
	Sanatogen	Gen.
Prontosil album	Farex	Glaxo.
Prontosil rubrum	Proseptasine M. & B. 693	M & D
- dorum	Sulphanilamide	A. & H.; Boots; B. D. H.; B. W.; Glaxo; M. & B.
Pront "	Streptocide	Evans.
Prontosil soluble	Proseptasine M. & B. 693 Soluseptasine	M. & B. M. & B.
Quadronal	Streptocide solution	Evans.
	Antipyrine, phenacetin, and	Boots; B. D. H.; Evans.
Quadronox	caffeine.	
	Antipyrine, phenacetin, and	B. D. H.; Evans.
Recedrin Sajodin	barbitone.	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B.
Journ	Ephedrine hydrochloride B. P. Iodoprotein	Boots.
8.	Iodicin	B. W.
Salyrgan	Iodocasein	Whiffen.
Cantyl	Neptal	M & B.
•	Sandalwood oil capsules	A. & H.; Boots; B. D. H.; B. W.; Evans
	Savaresse's santal capsules	Evans.

TABLE II—concld.

	The state of	
Foreign product	British product	British maker and/or supplier
Selvarol	Calcium lactobionate Calcium lævulinate (lævulate) Percalcin Levu-calcin (calcium lævul- inate).	A. & H. B. D. H.; B. W.; Evans. Evans. Glaxo.
Solargentum Solganal Solganal B Solganal B oleosum Spinocain	Silver-proteinate B. P. Crisalbine Myocrisin (aqueous) Myocrisin (oily) Procaine, strychnine sulphate and alcohol. Arecan spinalanæsthetic	A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B. M. & B. M. & B. B. D. H.  Evans.
Spirocid	Duracaine (procaine formula P. G.). Leucarsone	
Thiocol syrup Thyraden	Bronchial syrup Evans Thyroid B. P. Thyroxine sodium B. P. Tabloid thyroid	Evans. A. & H.; Boots; B. D. H.; B. W.; Evans. Boots; B. D. H.; B. W.; Evans.
Tutocain	Procaine hydrochloride B. P. Planocaine Arecan	B. W. A. & H.; Boots; B. D. H.; B. W.; Evans; M. & B. M. & B.
Uleron	Sulphanilamide	Evans. A. & H.; Boots; B. D. H.; B. W.; Evans; Glaxo; M. & B.
Unden	Streptocide M. & B. 693 Stilbæstrol Clinestrol	Evans; M. & B. A. & H.; Boots; B. D. H.; Glaxo.
Valisan Valvl	Bornylisovalerianate Menthyl valerianate	B. D. H.; Evans. A. & H.; B. D. H.; Evans; M. & B.
Varicophytin	Bornylisovalerianate Sodium morrhuate Sodium salicylate B. P. Quinine and urethane Hypoloid sodium salicylate Varixol	B. D. H.; Evans. A. & H.; B. D. H.; B. W.; Evans; Glaxo. Boots; B. D. H.; Evans. Boots; B. D. H. B. W. Evans.
Veramon	Ethamolin Varicaine Barbitone and amidopyrine Sonalgin	Glaxo. M. & B. A. & H.; Boots; B. D. H.; Evans. M. & B.
A. & H. = Burro	h Drug Houses Ltd. ughs, Wellcome & Co. and Handburys, Ltd. cosan, Ltd. and Baker, Ltd.	Boots = Boots Pure Drug Co., Ltd. Evans = Evans Sons Lescher and Webb, Ltd. Whiffen = Whiffen and Sons, Ltd. Howards = Howards and Sons, Ltd. Glaxo = Glaxo Laboratories, Ltd.

# Medical News

### ASSOCIATION OF SURGEONS OF INDIA

THE Association of Surgeons of India offers an annual prize of the value of Rs. 100 to the best essay based on original work on a subject to be decided by the Governing Body of the Association and announced at the beginning of every year.

The following are the conditions of the award:—

1. The competition is onen to all qualified medical

The following are the conditions of the award:—

1. The competition is open to all qualified medical practitioners registered in India, who have been in practice for not more than 10 years after qualification.

2. The essay should be based on original work and should be written in English.

3. It should be type-written on one side of the paper only and should not contain the name or other indication of the identity of the competitor.

4. The name, address and qualifications, however, should be written on a separate sheet of paper and enclosed with the essay.

enclosed with the essay.

5. The subject for 1940 is 'Blood changes in surgical inflammations'. Candidates may, however, restrict themselves to any one aspect of the subject, and the

essay should reach the Secretary before the 1st December, 1940.

6. The copyright for the winning essay will remain with the Association of Surgeons of India. Other essays will be returned to the senders if accompanied by stamped addressed opening and accompanied by stamped addressed opening the senders of accompanied to the

by stamped addressed envelopes.
7. The Governing Body may at its discretion withhold the prize during any year if the essays submitted do not come up to the standard.

8. All companying the above are to be

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8. All communications regarding the above are to be addressed to the Secretary, Association of Surgeons of India, Binfield, Kilpauk, Madras.

# KEEPING YELLOW FEVER OUT OF INDIA

New rules designed to keep out yellow fever from India have lately been promulgated by the Government of India for the control of aircraft coming to India from areas in Africa infected with yellow fever.

Henceforth no aircraft which is coming from or on the control of the co

Henceforth no aircraft which is coming from or its journey to India has alighted in Angola, Congo, Egyptian Sudan south of Khartoum, Belgian

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Cameroons, Dahomey, French Equatorial Africa, French Guinea, French West Africa, Gambia, Gold Coast Colony, Ivory Coast, Kenya Colony, Liberia, Nigeria, Senegal, Sierra Leone, Tanganyika Territory, Togoland, Uganda and Upper Volta Territory will be allowed to land for the first time in British India at any aerodrome other than the Karachi Air Port or the Karachi Marine Air Port.

It will also be an offence for any one to being its content of the second conte

It will also be an offence for any one to bring into India an aircraft which has on board a case of yellow fever or any person who within nine days of arrival in India has been in an infected area unless he has been protected by satisfactory inoculation or by a previous attack of the disease or has only alighted in an infected area at a non-infected anti-amaryl aerodrome. An aircraft which had on board a case of yellow fever must also have been properly disinsectized and appropriate preventive measures must have been taken with regard to the passengers, crew and cargo on board before it can be allowed into India. It will also be an offence for anyone to bring into India an aircraft which has started from or alighted in an infected area and subsequent to such starting or alighting has not obtained from the appropriate authorities a certificate of disinsectization. Severe penalties can be imposed on persons who transgress these rules.

Any aircraft which does not satisfy these conditions

and attempts to enter into British India may be refused

Should an infected aircraft reach India, both the aeroplane and its cargo will immediately be disinsectized. Any persons suffering from yellow fever and any persons who may have been exposed to intelled tion within the previous nine days will be immediately isolated in the mosquito-proof isolation hospital at Karachi.

The rapid development in air traffic in recent years makes it necessary to adopt stringent precautions against the introduction of yellow fever into India. Careful investigations have shown that a large endemic area exists in Africa and the infection is to be found over a much wider tract than was imagined. It has been proved by means of blood tests that yellow fever infection is widely distributed in the state of the st infection is widely distributed in a region to the south of the Sahara Desert and extending from the coast of

Senegal eastwards for over 3,000 miles to the upper region of the Nile in the Anglo-Egyptian Sudan.

Proximity to infected areas.—Certain air lines are now carrying passengers and mails via Alexandria to the Far East. Another air route is in operation between South Africa and Funday an South Africa and Europe via Kenya, Sudan and Alexandria. The latter route traverses areas dangerously near infected parts of Central Africa and actually

passes through certain territories where blood tests have shown that yellow fever has been in existence at least within recent years.

There is also an air route between Lagos in West Africa and Khartoum from and through a territory know to be endemically infected with yellow fever so that it is possible for yellow fever infected persons to be carried to India from these regions within the incubation period of the disease. Moreover, if infected mosquitoes get into an aircraft and bite a passenger en route, that passenger may reach this country in an apparently fit state of health and develop the disease only after his arrival.

Nearly a dozen species of mosquitoes are known to be capable of carrying the disease, but the main culprit is the *Edes ægypti*, a domestic species of mosquito widely prevalent in India. There is also in India a vast reservoir of monkeys now known to be susceptible to the disease should it become imported into India. The potentiality of real danger is, therefore, apparent.

Air port of entry.—Karachi, the converging point of five air lines including all aircraft coming from the West, is the port of entry into India. Being thus in a key position for any preventive campaign against yellow fever, its air port has been provided with a suitable health staff and steps have been taken to prevent the introduction of this scourge. Adequate provision has been made for the segregation of suspension of superscript of the segregation of superscript. pected or infected persons arriving by air, a twelvebedded mosquito-proof hospital having been built on the outskirts of the aerodrome. A mosquito-proof ambulance is also available for transport to hospital of suspected persons arriving at the Marine Air Port.

The fumigation of all aircraft coming from suspected or infected areas has been the general practice for the last two or three years. Every compartment of the aircraft is fumigated before any unloading of baggage, mails, etc., is allowed, so that mosquitoes, if there be any, may be destroyed.

In 1936, the Government of India issued regulations prohibiting entry of aeroplanes which started from or alighted in an infected or suspected area within the previous nine days, unless the person in charge of the aeroplane had, subsequent to such starting or alighting, obtained from the appropriate authorities a certificate of disinsectization. The same rule applied to any person who started from or alighted in an infected or suspected area except at an anti-amaryl aerodrome within the previous nine days unless he had been protected by satisfactory inoculation or by a previous attack of the disease. The present rules are an amplification of these regulations.

# Current Topics

# Oxygen Therapy in Pneumonia

By M. A. BLANKENHORN, M.D.

(Abstracted from the Journal of the American Medical Association, 7th October, 1939, p. 1410)

Cyanosis is the main and only important indication for oxygen therapy in pneumonia. While it can be said in theory that cyanosis exists in some degree in every patient with pneumonic it does not follow that every patient with pneumonia, it does not follow that ton for the routine use of oxygen to prevent cyanosis.

Cyanosis. Cyanosis is a difficult sign to evaluate quantitatively and, since that is exactly what must be done to decide about oxygen therapy, there is a tendency to use it the prognosis looks bad and there is not very much to done about it. Now that there is at hand for most

pneumococcal pneumonia a good remedy, the need for oxygen is definitely reduced. I find in our hospital at Cincinnati that more of our patients have got well and that we have used much less oxygen since we began the use of serum or sulphapyridine in the early stages

The exact therapy of pneumonia with oxygen has been developed by keeping patients in oxygen-filled rooms for continuous treatment, which treatment is tested by measuring the actual oxygen content of arterial and venous blood. With this experience some of the guesswork goes out and it can be seen that severe anoxemia does occasionally occur in the early stages of pneumonia, oftener in the late stages, and that oxygen sometimes relieves this anoxemia. that oxygen sometimes relieves this anoxemia. anoxemia is most likely to occur when many lobes are consolidated; when the respirations become rapid and shallow, i.e., above forty per minute; when there is moisture in much of the bronchial tree, and when there is wheezing. These circumstances can bring on serious oxygen want which may initiate many symptoms that resemble the toxic effects of infection, viz, steadily rising pulse rate with finally falling diastolic blood pressure, headache, dimness of vision, mental disturbances such as delirium, and coma. Oxygen want may cause or increase abdominal distention, also vomiting. When oxygen is successfully given, many, sometimes all, of the distressing signs and symptoms disappear in a few hours and the treatment then is life saving.

Oxygen treatment may not be successful in relieving anoxemia for a number of reasons other than reasons of technique. It cannot succeed if too much lung is consolidated or obstructed by exudate. It cannot succeed if the circulation is failing or if there is toxic depression of the respiratory centre by infection or drugs. Since none of these causes of failure are easily apprehended, the technique of administration of oxygen must be carefully ordered and practised by the physician to avoid failure that can be avoided. Important points are these: The supply to the patient must be continuous and abundant, so that only large cylinders are satisfactory; these must be equipped with reducing valves to assure steady flow and flow meters are very useful as well; the inhalation device must be comfortable and must not hamper the free escape of carbon dioxide and moisture. Tents, face masks and nasal tubes can all be made to serve satisfactorily, but they all require skilful and understanding care such as is rarely given by nurses or attendants. They all must be supervised by the doctor, who understands both the disease and the treatment.

Tents are the most expensive, troublesome and difficult to operate but are the most successful generally, except of course the oxygen chamber. Tents are best run by experts, such as the anæsthesia department or gas therapy service in large hospitals. I have found that hospital assistant residents do the job very well in the Cincinnati General Hospital and that they learn a lot about the physiology of respiration by doing that service. Some tents require a gas washer of soda lime to take out the carbon dioxide. This greatly adds to the cost and trouble. Other tents rely on cooling and drying the circulating air with large ice chambers, and much ice is needed for air-conditioning. This cooling and drying to take out carbon dioxide often contributes much to the comfort of the patient. Tents should usually have from 35 to 40 per cent oxygen but may be run for a long time at 60 per cent oxygen. Tents provide a high concentration of oxygen as well as a cool, dry atmosphere, which many patients enjoy if the tent is right. A hot tent, not properly cooled and cleared of carbon dioxide, is a terrible thing to a conscious patient; but there is no need for a tent ever to be uncomfortable. A gas tester is necessary to keep tent service up to this standard. Delirious patients sometimes fight the tent and win, for tents are not tough. In this circumstance the doctor must do some skilful guessing to decide about restraining the fighter or narcotizing him. The first procedure runs up the oxygen need possibly more than it will be helped by the tent; the latter choice depresses the respiration, sometimes increasing the cyanosis. The doctor must keep his eye on cyanosis and try the various chances.

Face masks and face tents in my hands are almost as bad as tents in arousing the fight in a delirious patient. Nasal tubes or catheters are the best for this patient usually.

Face masks are not suited to continuous use, such as the pneumonia patient needs, if the mask is closed. If the device is open to allow unhampered flow of expired air, it becomes a face tent of sorts and I think that with care to details, especially adequate oxygen flow, this arrangement will work; but I have had no real satisfaction in their use. The purpose of such a device is to<sup>1</sup>retain a rich atmosphere during expiration so that when inspiration comes the inrush of room air through the mouth or nose will not dilute the stored gas too greatly.

Nasal catheters are used in many instances, even when tents are at hand. Such an arrangement is simple with flow simple when tents are at hand. Such an arrangement is simple and costs little, but large cylinders with flow metres are needed as for tents. Catheters are sometimes tolerated by delirious patients who fight the tent tolerated by delirious patients depends on care in the tent. Success of nasal catheters depends on care in placing Success of nasar catheters deposite there. The catheter tip and keeping it there. The catheter the catheter tip and keeping to the catheter becomes a discomfort for several causes, mostly preventable. If the catheter wiggles about with head motion this is overcome by held; preventable. If the catheter wiggles about with head motion or bed motion, this is overcome by holding it down to the face with adhesive tape. If the inflow is too fast through a single perforation in the catheter wall, a 'hot spot' develops; this is overcome by moving it about and by humidifying the gas; also by moving it about and preprints. Catheters may fail to the catheter was also by moving it about and by intimiding the gas; also by having plenty of openings. Catheters may fail to deliver enough gas if the tip is not near the pharynx. In this circumstance the soft palate may obstruct the inflow and the gas then goes in one nostril and out the other. If the patient breathes through the mouth and the method of inspiration is quick, the inrush of room air dilutes the gas and the whole result is a weak mixture. I know of no way to overcome this difficulty entirely if the patient will not tolerate having his mouth closed with a piece of moist gauze taped over the mouth for a flutter valve. When the catheter tip is well in the oropharynx so that the entire oropharynx is entirely filled with oxygen, this dilution effect is diminished. The dilution effect is also less when the volume of each breath is not great; hence the catheter flow can supply the entire inspiratory volume and even more in rapid and shallow breathing. In some circumstances 40 per cent of oxygen or more has been provided in respired air through the catheter. The catheter should be replaced by a clean one every twelve hours or less. It should be greased with oil that will not evaporate, as with liquid petrolatum, and the naso-pharynx sprayed with oil. This protects the mucous membranes from the drying effect that eventually burns or smarts painfully, causing the 'hot spot'. catheters the oxygen dosage must be regulated with the flow meter; but no one can prescribe the litres per minute that will relieve cyanosis. A good practice is to start the flow at as high a figure as the patient will endure, and 10 litres is about the maximum. If this is adequate, the colour may improve in a few minutes When there is a definite change, the flow may be reduced; from 6 to 8 litres per minute will generally be tolerated and the cost at this rate of flow is not great. If 10 litres per minute does not help the colour of the patient in an hour, one should try placing the catheter tip lower into the oropharynx—at a spot below the palate but where the swallowing reflex will not interfere. Two catheters, one in each nostril, may be used if the patient breathes through the mouth: the flow to each actheter can the flow to each catheter can then be reduced to a tolerable

Oxygen therapy to be useful must be continuous as long as cyanosis develops if the treatment stops. It is not harmful to stop it for a test of doing without it, except in widespread pneumonia when there is much moisture in the air passages. Here oxygen is helpful and very necessary. Some patients seem to become habituated to a rich atmosphere of oxygen, but this condition does not develop in a short time nor has it been described in lobar pneumonia.

With the best of technique oxygen may in certain cases be life saving to the pneumonia patient, but it is very difficult to prove the point. Where oxygen has been most intelligently used and checked with blood measurements, this form of pneumonia always regarded as of minor importance in lobar pneumonia as compared with serum or chemotherapy in suffocating pneumonia, such as in capillary bronchis in wet hæmorrhagic pneumonia, as in influenzation pneumonia after corrosive gases; in asthma complicated by pneumonia, or in pneumonia complicated by acute bronchiolar spasm—in these forms oxygen may be the most important item in treatment.

most important item in treatment.

Properly administered, oxygen inhalation is should patible with any other form of treatment. It hand never substitute for specifics when such are

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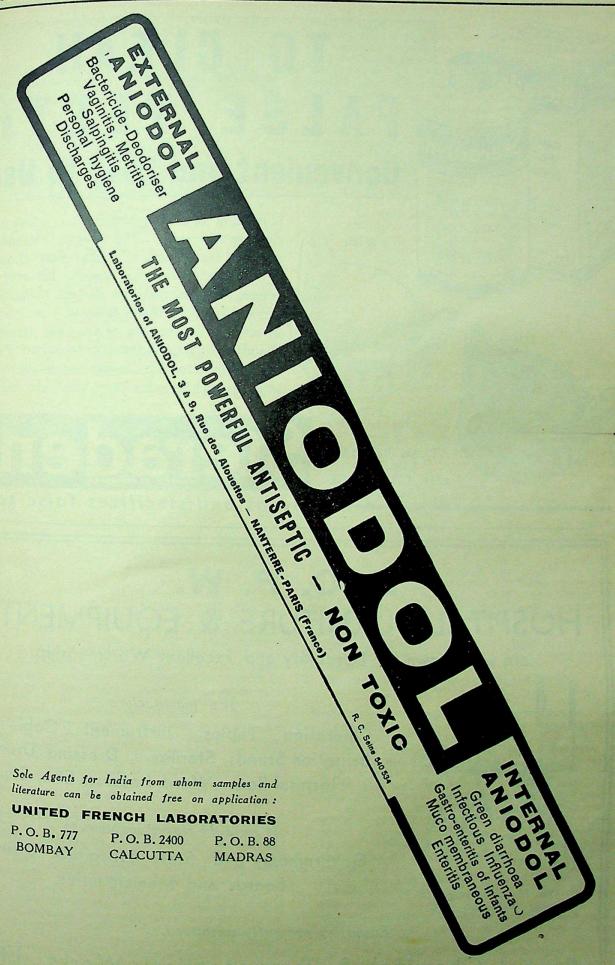
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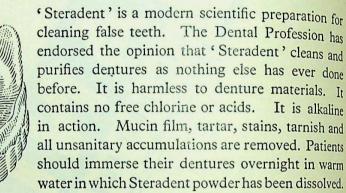
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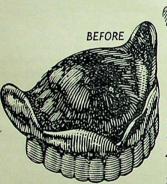




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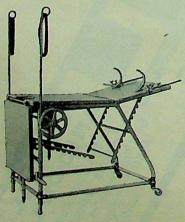
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# Reviews

PROBLEMS OF AGEING: BIOLOGICAL AND MEDI-CAL ASPECTS.—Edited by E. V. Cowdry. 1939. Baillière, Tindall and Cox, London. Pp. xxx plus 758. Illustrated. Price, 45s.

AGEING has become a serious social problem. In the United States the time is not far ahead when one-third of the population will be over 50 years of age. In this mechanical age, the market value of experience, the main asset of the aged or middle-aged, is decreasing, and consequently there is more unemployment amongst this group than amongst the younger and more energetic members of society. This has led to attention being paid to the subject of ageing, and it is surprising how very poor our literature on this subject is. The present volume is the beginning of an attempt to fill

The scope is a wide one; it ranges from the ageing of protozoa to that of man's various systems, tissues, and organs, and includes chapters on the ageing of trees, insects, and vertebrates. Each chapter is contributed by an expert and the subjects are so specialized that in only one case has a contributor written more than one chapter. Most of the contributors are Americans, but Dr. Macdonald Critchley of King's College Hospital has written the chapter on ageing of

the nervous system.

Trees vary considerably in their rate of ageing, as there are some quite large varieties that under certain conditions grow and age in a matter of a decade or so, whilst at the other end of the scale we have the great tree of Tule which is variously estimated at 5,000 to 7,000 years old. Man's rate of ageing varies, but not to this extent! However, sufficiently to make hard-and-fast rules regarding the age of retirement, in certain professions where experience is an asset, ridiculous.

Different subjects have demanded different lines of approach. In the matter of the ageing of the male and female reproductive organs there is a good deal of data on which to base the discussion, though the writers on these subjects deplore the paucity of this data, but in others there is practically none. Perhaps the most difficult and the most difficult and the most interesting chanter is the most difficult and the most interesting chapter on tissue fluids; there is a very great deal of valuable information on tissue fluids, the importance of which is now being appreciated, but in the matter of ageing there is little more than an indication how this may be studied. However, the facile and witty pen of the editor of this series, who himself contributes this chapter, has made it a most readable one.

The final chapter is on the clinican's point of view:

The final chapter is on the clinician's point of view; in this chapter amongst other things is an analysis of the ailments of 300 patients over the age of 60 who have come to the writer's clinic for investigation. These patients constitute 10 per cent of the total attendance, but the age tails off rapidly, as only three are over 80. Programs by these over eighty are more are over 80. Presumably those over eighty are more inclined to accept their ailments as facts, and prefer

not to be interfered with.

This is an important book, being in its way a pioneer publication on a new line of study, and as such we

AN INDEX OF TREATMENT.—By Various Writers.

Edited by Sir Robert Hutchison, Bt., M.D., LL.D.,
P.R.C.P. Assisted by Reginald Hilton, M.A., M.D.,
F.R.C.P. Twelth Edition 1940. John Wright F.R.C.P. Twelfth Edition. 1940. John Wright and Sons Limited, Bristol. Pp. xv plus 996. Illustrated. Price, £2-2-0

This book was first published in 1907 and scored a success which can seldom have been equalled in the history of medical publication in Great Britain, as within one year it went through no less than four editions. After this presumably the publishers learnt ditions. After this presumably the publishers learnt to print larger editions. The present edition is published after an interval of four years, and, as they

have been very eventful years, the revisions have been numerous and extensive

There are about eighty contributors, recruited from the cream of British hospital and consultant practice. This makes criticism of the individual sections difficult. The majority of the tropical diseases are in the able hands of Dr. P. Manson-Bahr, so that an often fruitful field of criticism has been largely removed. We must however remark that 'anæmia, tropical' is a poor heading for a section. We doubt the existence of such a condition and with regard to the statement that a condition and, with regard to the statement that 'secondary anemias' due to a sedentary life are common, we do not agree with the classification, the setiology, or the fact. We do not think that injections of iron should be recommended in secondary anemias. The sub-heading ankylostomiasis, as distinct from secondary anæmia, seems a little difficult to justify; but in the treatment of this condition we are pleased to see that thymol is not recommended, though we are sorry that there is no mention of tetrachlorethylene. This section heading should be abolished or the section completely re-cast.

All sections have been revised and a few new ones added, so that this invaluable publication has been brought up to date. The revisions justify the replacement of the last edition by the present one for those who can afford the cost; we beg them not to throw away their earlier edition, but to give it to a poorer friend; it should serve him for many years yet.

CONGENITAL HEART DISEASE.—By J. W. Brown, M.D. (Lond.), M.R.C.P. 1939. John Bale Medical Publications Limited, London. Pp. xvi plus 255. Illustrated. Price, 21s.

THE subject of congenital heart disease has been attracting increasing attention during recent years. The pioneer work of Maude Abbott is responsible for the marked advance of knowledge of this intriguing subject. We are no longer justified in conjuring up a picture of a cyanosed undersized child of indifferent mental development when thinking of congenital heart disease, nor in regarding anatomical diagnosis of most cases as a matter for the post-mortem room.

In this book the author has presented us with a brief account of the various congenital heart diseases. He has described in detail the embryology and morphology of the human heart, the ætiology, frequency, and the various types of congenital anomalies of the heart, their clinical features, electrocardiographic and radio-logic course, and prognosis. There are chapters on infective endocarditis, special cardiological methods of examination, differential diagnosis, general prognosis and treatment.

There are numerous well-chosen illustrations, a large number of which are original. The different sections are well written.

The book will prove useful to cardiologists.

P. C. S. G.

COMBINED TEXTBOOK OF OBSTETRICS AND GYNÆCOLOGY: FOR STUDENTS AND MEDICAL PRACTITIONERS.—Revised and Rewritten by J. M. Munro Kerr, LL.D., M.D., F.R.F.P. & S. (Glas.), F.R.C.O.G., R. W. Johnstone, C.B.E., M.A., M.D., M.R.C.P., F.R.C.S. (Edin.), F.R.C.O.G., James Hendry, M.B.E., M.A., B.Sc., M.B., F.R.F.P. & S. (Glas.), F.R.C.O.G., D. Baird, B.Sc., M.D. (Glas.), D.P.H. (Edin.), F.R.C.O.G., J. Young, D.S.O., M.D., F.R.C.S. (Edin.), F.R.C.O.G., D. McIntyre, M.B.E. F.R.C.S. (Edin.), F.R.C.O.G., D. McIntyre, M.B.E., M.D. (Glas.), F.R.F.P. & S. (Glas.), F.R.C.S. (Edin.), F.R.C.O.G., F.R.S.E., and E. C. Fahred. M.B., F.R.C.P., F.R.C.S. (Edin.), F.R.C.O.G. Third Edition. 1939. E. and S. Livingstone, Edinburgh. Pp. xii plus 1192, containing 499 illustrations and numerous x-ray plates. Price, 37s. 6d. Postage,

This 'combined' textbook of the Scottish medical schools has already earned a sound reputation. This is the third edition and the demand for the book has obviously been satisfactory for each of the earlier editions had to be reprinted.

The idea of the 'combined' book is such an obvious one that it is surprising that the practice of combining the subjects has not been followed oftener; we can see only one real objection—the extra strain on the students' wrists, and many advantages, for ninety per cent of the pathological conditions that are peculiar to women have some direct association, before, during, or after the event, with child bearing. The division between pathological obstetrics and gynæcology is really a very artificial one.

The book is as complete a treatise on the subject as the student or the practitioner can wish for, and is designed to supplement the clinical lectures and practical demonstrations which the student will attend. Over a hundred pages are devoted to the anatomy and physiology of the reproductive organs. The division of the obstetric portion of the book is the usual one, into normal pregnancy, pathological pregnancy, normal and abnormal labour, the puerperium and the infant. There are short chapters on obstetric operations and puerperal mortality. There is a section headed gynæcology. It seems to the reviewer that it would have been more in the spirit of the book to have avoided this heading and grouped the chapters in this section under some other major headings.

The section on gynæcological operations is short, as the book is not written for the benefit of the gynæcological surgeon. The last section is on radiology, and includes both diagnosis and treatment.

It is a pleasant book to handle and to read. The print is good and the illustrations numerous, clear and relevant. The subject is dealt with comprehensively and the authority of the writers is beyond dispute. It is a book well suited to practice in this country.

FRACTURES AND OTHER BONE AND JOINT INJURIES.—By R. Watson-Jones, B.Sc., M.Ch. (Orth.), F.R.C.S. 1940. E. and S. Livingstone, Edinburgh. Pp. xii plus 723, with 1,040 photographs, x-rays, and diagrams, many of which are in colour. Price, 50s. Postage, 1s.

Considering the great importance of the subject, it is surprising to note that this new book is the first really thorough treatise on fractures and allied conditions to be written by a British surgeon. That it is the work of Watson-Jones of Liverpool should be sufficient guarantee of its worth. He and his associates have in the past published many original articles of the highest value on pathology, treatment, and diagnosis. These, together with some new work, have been incorporated in this book. But the bulk of the book is taken up with principles of treatment and details of technique which, though undeniably 'as done at Liverpool', are also representative of what is being taught and practised in the best fracture clinics throughout Great Britain.

The first part of the book describes the principles of fracture treatment, and includes the discussion of a complication of fractures to which the term avascular necrosis is given. Through loss of its blood supply, bone and articular cartilage undergoes immediate necrosis and may subsequently pass through the stages of regeneration and healing. The condition is recognisable radiologically only during the second and third months, when the necrotic bone which still retains its calcium, appears dense by contrast with the decalcifying living bone. The fractures, dislocations, and fracture-dislocations that are peculiarly liable to this complication are described in detail. In certain instances timely excision of bone which has undergone avascular necrosis is advocated. For instance, although an avascular fragment of a fractured scaphoid will unite if the wrist is immobilized for sufficiently long, the author is now of the opinion that better function and less arthritis result from excision of the fragment directly there is evidence that avascular necrosis is taking place.

Also worthy of special remark is a short section on the reduction and immobilization of fractures, which includes a careful description of plaster technique. For walking plasters of the lower limb a metal stirrup is not favoured, because most patients acquire a bad gait. A leather boot of standard appearance, but made to

Part II deals with pathological and birth fractures, and parts III to V describe fractures, sprains, and dislocations of each region in turn, the profusely illustrated text showing not only the correct treatment but also 'how not to do it'.

In part III, concerned with injuries of the trunk and head, the author's technique for reduction and immobilization of spinal fractures, already well known, is given in detail; also a new method of treating spondylolisthesis by manipulation is described. In addition, concise information is presented on two conditions which hitherto have received more attention in America than in Europe—painful affections of the lower back, and retropulsion of the intervertebral discs.

Mention must also be made of the author's operation for recurrent dislocation of the ankle. Briefly stated, this consists of the use of the peroneus brevis tendon for tenodesis and ligament reconstruction at the outer side of the ankle. From its very nature the operation must be open to the same objections as those of Hey Groves or Alexander Edwards' operations on the knee, and these are given but brief and unfavourable comment in this book.

Part VI is a collection of unusual and instructive cases, and the book ends with an appendix describing the organization of a fracture service, with photographs and plans from the Liverpool Royal Infirmary. Perhaps it would be possible, in a future edition, to reproduce an illustration of one of the case records from this fracture clinic, for they are marvels of clarity and completeness.

The book is a delight to handle. The publication has been beautifully done; the illustrations are excellent, the text almost entirely free from errors, and there is a generous bibliography. It should be in the hands of everyone who has much to do with fracture cases.

W. McN. N.

DEMONSTRATIONS OF PHYSICAL SIGNS IN CLINICAL SURGERY.—By H. Bailey, F.R.C.S. (Eng.). Seventh Edition. 1940. John Wright and Sons, Limited, Bristol. Pp. xii plus 310, with 377 illustrations, some of which are in colour-Price, 21s.

The last edition of this book was published in 1937 and was reviewed very favourably in our January issue of 1938. There is little more for us to add to what has already been said regarding the earlier edition, except that further improvement has been effected. There is one quite pleasant innovation; whenever the name of any syndrome, test, sign, structure, or instrument that has any proper name attached to it, Plummer-Vinson syndrome, Murphy's kidney punch, Douglas's pouch, etc., is mentioned a short, one-line, biographical note is added to help the reader to visualize the individual referred to, but he is given the option, and if he doesn't want to have his train of thought disturbed by place-names and dates he needn't, for the information is conveyed in a footnote. Douglas for example was a physician to Queen Caroline and died in the year 1742; his name conjures up the picture of a fashionable bewigged physician, but not so that

The scope of the book is completely expressed in its title, for every sign is not only described but demonstrated by beautiful photographs; many of these are in colour and are excellently reproduced.

The new generation of students have much to they plain about in the length of the curriculum, but them are lucky to have books of this kind to help over the early stages of clinical work.

We strongly recommend this book to the medical student and to his teacher. For the practitioner it is an ideal book of reference.

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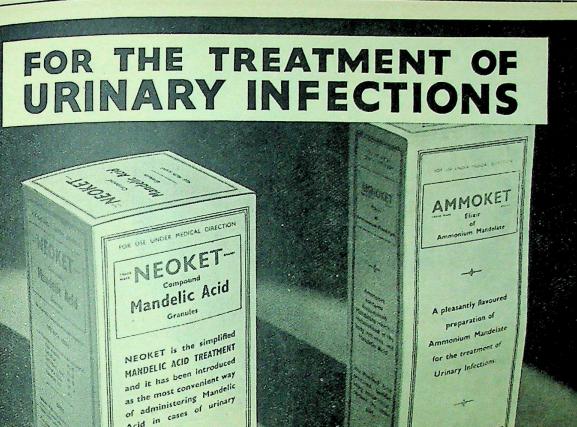
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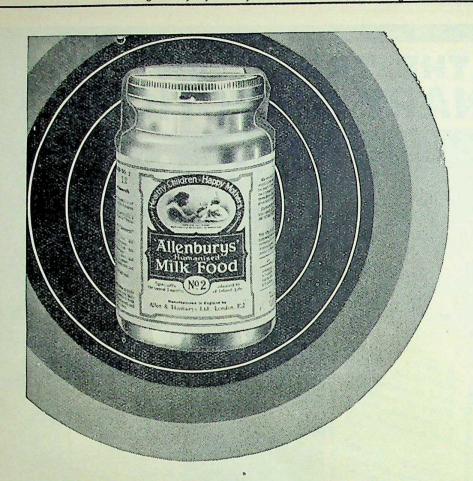
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OF SURGICAL ILLUSTRATIONS TREATMENT: INSTRUMENTS AND APPLIANCES.—By E. L. Farquharson, M.D., F.R.C.S.E. 1939. E. and S. Livingstone, Edinburgh. Pp. x plus 338. Illustrated. Price, 20s. Postage, 6d.

WHEN a book of this kind has a foreword written by Sir John Fraser, the temptation to quote from it freely is too strong to resist. His opinion on the value of this book will carry far more weight than that of any

anonymous reviewer.

'Mr. Farquharson has a reputation for ingenuity, and it seems to me that this book is a confirmation of that opinion. He has produced a volume which is in certain respects unique. Without entering into operative detail he has collected and described procedures which are of supreme importance to house surgeons and clinical assistants. He has described them so clearly and so fully that there is no room for misconception or doubt, and further, he has given us information on a diversity of subjects such as are rarely brought together within the compass of a single volume. While the book has the merit of individuality (for many of the methods described bear the stamp of Mr. Farquharson's inventive mind), it is in no way parochial or local in its information. Where there are different means of obtaining the same object, they are described, but the whole is presented on a critical and analytical basis, so that the reader is left in no doubt as to the merits of the choices

'I believe that the book will fill an important place in surgical literature. Its originality will make an appeal, but over and above that it will gain approval for the wealth of its detail and the essentially practical manner in which it is conceived and presented.

'One of its outstanding features is the character of the illustrations. A good diagram or photograph can be more informative than a page of textual description, and in this instance the illustrations are so well chosen and so accurate that, though the text is exceedingly clear, they are adjuncts which satisfy questioning and clarify impressions

This leaves us little to add. The first few pages are on infusion and transfusion. The next twenty sections are on the appliances, and their method of application, used in the treatment of fractures, dislocations and other bone and joint injuries. The last third of the book consists of 57 plates of other instruments and appliances with descriptive notes.

It is an ideal book for the student, the house surgeon, the nurse—especially the theatre nurse, and it will make an invaluable book of reference for the practitioner.

WAR WOUNDS AND AIR RAID CASUALTIES.
Articles republished from The 'British Medical
Journal'. Contributed by St. J. D. Buxton, E. M.
Cowell, C. Frankau, G. E. Gask, A. T. Hart,
G. Jefferson, W. A. Lethem, D. D. Logan, P. H.
Mitchiner, G. F. Nelicon, C. M. Back, J. Rickman Mitchiner, G. E. Neligan, C. M. Page, J. Rickman, C. Seeley, G. Gordon-Taylor, J. M. Vaughan, J. M. Weddell, M. B. Wright. 1939. H. K. Lewis and Company, Limited, London. Pp. xii plus 256. Illustrated. Price, 10s. 6d.

Although the articles which comprise this book have probably been read by many, their publication in book form should be popular. Written by seventeen specialist contributors the articles may be taken as specialist contributors, the articles may be taken as authoritative, and it is noteworthy that their appearance week by week in the British Medical Journal did not much week in the British Medical Journal did not produce in their train a series of criticisms from correspondents.

The articles may be divided into three groups. The first, medical organization; the second, general aspects of medicine and surgery in war time; the third, treatment and the

ment and therapeutics

In the first group Colonel Weddell describes medical organization in the field, and Drs. Lethem and Seeley describe the organization of the emergency medical describe the organization of the emergency medical services on the home front. These latter comprise the hospital arrangements under the Ministry of Health, and the First-aid Post arrangements under the county and borough councils. and borough councils.

In the second group of articles the section on war surgery in Spain by Dr. Tudor Hart is of outstanding interest. One point which became evident in this most recent war was the enormous improvement in results achieved when casualties were accessible surgical treatment very soon after injury. As regards the treatment of septic wounds, irrigation was not favoured but the bold course of subjecting heavilyinfected wounds to complete débridement, light packing, and enclosure in plaster gave good results.

The third group includes chapters on injuries to the various regions of the body, psychological casualties, the effects of chemical warfare, and so on. In her article on blood transfusion, Dr. Janet Vaughan gives an outline of the latest ideas on the subject, and it should be of special interest to readers in this country, where blood storage centres are now in process of

organization

This book is not for the totally uninstructed, but, embodying at it does the important recent advances in the management of casualties, it provides the practi-tioner with a supply of ideas from which he can work. Those who may be required for active service should have it in their possession, but it is also recommended to those whose work is at home because, after all, there are no great differences, except numerical, between the casualties of war and the casualties from accidents in peace time.

W. McN. N.

ABDOMINAL INJURIES OF WARFARE.—By G. Gordon-Taylor. John Wright and Sons Ltd., Bristol. Pp. 87, with 68 illustrations. Price, 10s. 6d.

Ar the commencement of the last war, the view was entertained by many staff officers that abdominal surgery was not a sound economic proposition in war time military surgery. Indeed, it was not until 18th March, 1915, that the first bowel injury was successfully operated upon on the British Front-one of the many cases described in this book. As the war progressed more and more cases were dealt with by the surgical teams of the casualty clearing stations, and this small volume might be described as a record of the experience gained in them.

There are 68 excellent illustrations of actual injuries to abdominal organs, mainly derived from the War collection of the Royal College of Surgeons of England. The writer in his preface describes his text as purporting to be little more than a companion-guide to the illustrations, but the practising surgeon will find it concise and to the point. To many, the absence of the redundancies far too commonly met with will be a relief. Many actual case histories are given which make interesting, and sometimes encouraging, reading

In present-day warfare the scope of abdominal traumatic surgery has spread beyond the limits of combatants in the firing line, and this book is of value to the civil as well as the military surgeon. The morale of both soldier and civilian will be improved in the knowledge that all is not hopeless if some belligerent action disturbs the integrity of his or her abdominal viscera.

J. C. D.

A SYNOPSIS OF SURGERY .- By Ernest W. Hey Groves, M.S., M.D., B.Sc. (Lond.), F.R.C.S. (Eng.). Eleventh Edition. 1940. John Wright and Sons, Eleventh Edition. 1940. John Wright and Sons, Limited, Bristol. Pp. viii plus 714. Illustrated. Price, 17s. 6d.

This is undoubtedly and deservedly the most popular synopsis of surgery published in the British Isles, and its usefulness has no geographical limitations. It is some years since the previous edition appeared and the book has been completely revised throughout.

One of the major modifications is the introduction of Böhler's technique for the treatment of fractures. The British are a conservative race but anything that is good they adopt wholeheartedly.

Other additions are a short description and sketch of Drinker's apparatus for artificial respiration.

The book is a masterpiece of compression; the art of the writer lies in the fact that truth is so seldom sacrificed to the exigencies of space, but occasionally this is inevitable. For example, it is stated that blood transfusion is 'the ideal method of treating anæmia'; the word 'surgical' would have saved the truth of this statement. The next few lines will also make the physiologist rub his eyes, when the words appear to read 'the blood contains hemolysin and agglutinins which may cause dangerous clotting if . . . ', but it is there, though the italics are ours.

This new edition of this invaluable book will be welcomed by final-year medical and post-graduate

SCLEROSING THERAPY: THE INJECTION TREAT-MENT OF HERNIA, HYDROCELE, VARICOSE VEINS AND HÆMORRHOIDS.—Edited by Frank C. Yeomans, M.D., F.A.C.S., M.R.S.M. (Lond., Hon.). 1939. Baillière, Tindall and Cox, London. Pp. xii plus 337, with 185 illustrations and 117 figures. Price. 27s.

It will be generally agreed that sclerosing therapy has emerged from the stage of experiment and empiricism. A practical monograph will, therefore, be acceptable to a large body of medical practitioners.

This book consists of four parts. The injection treatment of hernia is discussed by Dr. A. F. Bratrud in part 1 comprising eleven chapters. The chapter on the result of this method of treatment will be found very interesting. There is only one chapter in part 2 and this is on hydrocele and is written by Dr. G. F. Hoch. There is however no mention of hydrocele of filarial origin. Part 3, by H. J. Sheely, consisting of 15 chapters is devoted to the treatment of various voins. ters is devoted to the treatment of varicose veins. The author has recommended several solutions so that one may 'become well enough acquainted with these to be able to select the solution suitable for the individual case as well as for the different veins in the subject'. In the last part, the injection treatment of hæmorrhoids is fully discussed by the editor.

This is an instructive little volume which will be found useful by the general medical practitioner. The printing, get-up and illustrations are very good. The bibliography at the end of each part and the index will be appreciated by the inquirer. The price of twenty-seven shillings will not meet with general

approval in these hard times.

P. N. R.

MATERIA MEDICA, PHARMACY, PHARMACOLOGY AND THERAPEUTICS.—By William Hale-White, K.B.E., M.D. (Lond.), M.D. (Dub.), LL.D. (Edin.). Revised by A. H. Douthwaite, M.D., F.R.C.P. Twenty-fourth Edition. 1939. J. and A. Churchill. Instead London. By vining EEO. Price 120 6d. Limited, London. Pp. xi plus 550. Price, 12s. 6d.

THERE has been a steady demand for this book for nearly half a century and it has reached its twentyfourth edition in 48 years; the biennial regularity of the appearance of successive editions has seldom been

disturbed.

The most satisfactory part of this book is the thorough pruning to which it has been subjected from time to time, so that, although much new matter has been included and entirely new subjects, such as vitamins, have been added, the book has not grown in bulk; if the reviewer's impression is correct, the present volume is actually smaller than the edition has used volume is actually smaller than the edition he used 25 years ago as a student. One of the main savings has been in the descriptions of the physical properties of crude drugs, and, once more to introduce a personal note, the reviewer never remembers at any time exercising the knowledge on this particular aspect of the subject that he gained so laboriously—though it had its lighter side; it is satisfactory to know that the student of the present day, who has a far fuller curriculum than we had, is at least spared this.

The most important additions are, naturally, the sulphanilariides; others are tetraphlarathylana (northers).

sulphanilamides; others are tetrachlorethylene (perhaps a little belated), nicotinic acid, and the sex hormones. The book has been revised throughout wherever this

was necessary and the information, as far as the was necessary and the institution, as far as the reviewer was able to judge, is accurate and up to date. It is still the most useful and practical book of its kind for both the physician and the student.

HANDBOOK OF PHYSIOLOGY AND BIOCHEMISTRY —By the late W. D. Halliburton, M.D., LLD, F.R.C.P., F.R.S., and R. J. S. McDowall, M.D., D.Sc., F.R.C.P. (Edin.). Thirty-sixth Editor 1939. John Murray, London (Albemarle Street).

This book has served four generations of students and is now a nonagenarian but, we hurriedly add, a and is now a honagenarian completely rejuvenated. In recent years, editions have appeared regularly at two-year intervals There have been no striking changes in the present edition but all recent advances in our knowledge on the subject have been skilfully interwoven in the text of the previous edition.

The book is too well known to require any detailed description. It is a book that has always exercised a special appeal to the student and his teacher; it is easy to handle and easy to read; it is well illustrated and the text is concise and clear; and finally the authority

of the present author is unimpeachable.

TEXTBOOK OF PATHOLOGY. A CORRELATION OF CLINICAL OBSERVATIONS AND PATHOLOGICAL FINDINGS.—By Charles W. Duval, M.D., 1939. and Herbert J. Schattenberg, M.D. 1939.

D. Appleton-Century Company, London. Pp. xxll
plus 681, with 12 plates and 377 illustrations in the text. Price, 35s.

WITH the publication of this new textbook on pathology another addition is made to the long list of books on the subject from which the student has to make his choice. There is much to commend this book both to the student and the teacher. The authors have stressed the relationship between pathological physiology and altered tissue changes or morbid anatomy. There is in this book the proper blending of the morgue pathology with clinical medicine, with the result that subject is dealt with in a more comprehensive manner than in the restricted and narrow concept of pathology, in the full justification of the sub-titlea correlation of clinical observations and pathological findings.

All the usual subjects are included and dealt with under different systems. At the end of the book there is a prooful chartest are included and dealt with under different systems. is a useful chapter on autopsy in which the methods employed in the post-mortem room are detailed with a protocol giving an example of an autopsy report. The illustrations must be specially mentioned. There are excellent half-tone and coloured plates and many photographic illustrations. These are of exceptional excellence; they show the changes intended to be shown and prove that photography of pathological lesions is and prove that photography of pathological lesions is capable of giving satisfactory results. The publishers are to be congratulated on their most satisfactory reproduction.

This is a book that is certain to take a place amount the best books on the subject and can be confidently recommended to the medical student. C. L. P.

HUMAN HISTOLOGY: A GUIDE FOR MEDICAL STUDENTS.—By E. R. A. Cooper, M.D., M.Sc. 1939. H. K. Lewis and Company, Limited, London. Pp. xiv plus 423 with 207 live to the Paice, 16s. Pp. xiv plus 423, with 237 illustrations. Price, 165,

THE idea of this book is a good one; it is to provide the medical student with a handy guide to the elements of histology that will be suitable for use in his practical histology classes just as he were his the standard of the provide the provide the medical student with a handy guide to the elements of histology classes just as the week his the standard of the provide the medical students. histology classes, just as he uses his commingham, in the dissecting room. The book should be serve this purpose very well, but there is a little more in it than this, for the student will find it useful in later years, when he studies not below.

The explanations are concise and clear, and the book is profusely illustrated with photographs of sections. These show what they are supposed to show and do not leave too much to the imagination; on the other

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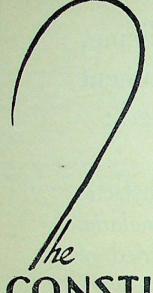
provide elements practical small k should the more useful in

the book sections, and do he other A specialist in Tropical Medicine, addressing a meeting of eminent malariologists, recently stated:

"I am definitely of the opinion that prophylactic quinine does prevent actual attacks of malaria. Once or twice the experiment was tried of withholding prophylactic quinine for a week or two from large groups of men. This was followed by such increases in the sickness rate from malaria that a rapid return to the prophylactic dose was made."

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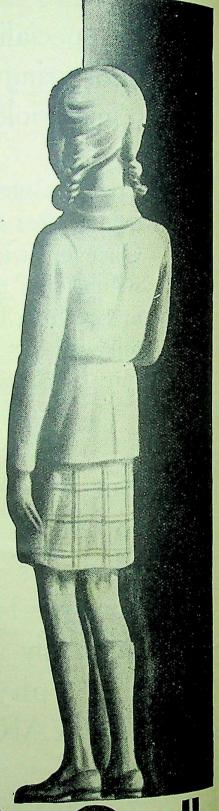


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hand they are the real thing and therefore much better than line drawings, which merely show the student what he ought to see, but seldom does. For the sake of the student, it is necessary to be precise, sometimes to the sacrifice of recent work which the writer may feel has not quite reached the stage of digestion suitfeel has not quite reached the stage of digestion suitfeel has not quite spleen. Surely, the main blood storage is in the sinuses themselves, and in an emergency we depend on these and not on the few red cells that have wandered into the reticular spaces in the pulp.

the pulp.

This is a book that should be particularly useful for class work in this country, for it will supply the student for the Indian university degree with as much as he will require on the subject for his examination; he will also find it a useful book of reference.

AN INTRODUCTION TO PATHOLOGY AND BACTERIOLOGY FOR MEDICAL STUDENTS IN THE TROPICS.—By E. C. Smith, B.A., M.D., D.P.H., Sc.D. (Dublin), M.R.C.P. (Lond.), M.R.C.P.I., D.T.M. & H. (Eng.). 1939. John Bale Medical Publications Ltd., London. Pp. xiv plus 279, with 18 plates and 77 illustrations in the text. Price, 15s.

The author wisely states in the preface that the book is not to be regarded as a substitute for the many excellent textbooks available but rather as an introduction to them. It is therefore difficult to understand why space which could have been more profitably utilized is taken up for depicting certain well-known laboratory apparatus. In reading through the text one comes to the general conclusion that there are many sections, too numerous to enumerate in a review, which have received but scanty treatment and which a student would find difficult to understand. Cholera, a disease of such major importance in the tropics, is disposed of in one page, botulism, a disease fortunately rare in the world and rarer still in the tropics, receives the same amount of space. The section on diseases caused by helminths particularly needs to be revised. There are many vague statements which would confuse the student. With judicial pruning and enlarging a book of this type would be of great value to the student of medicine in the tropics. There is a real need for a small book on pathology which stresses points of particular interest and importance in the

tropics, but in its present form this book cannot be recommended to the medical student.

C. L. P.

INDIAN MEDICAL SERVICE: A HANDBOOK.—By Major A. N. Chopra, I.M.S. 1939. Government of India Press, New Delhi. Pp. vi plus 256. Price, Rs. 2 or 3s. (Obtainable also from Provincial Government book depots and stockists of Government publications)

This little handbook contains a vast amount of useful information ordinarily scattered in different Government publications, or contained in various circulars which often are not available or in which the required information is difficult to find. Major Chopra has done a great service to his brother officers of the Indian Medical Service in bringing together, arranging, and indexing the various rules and regulations which govern the Service, together with a great deal of useful information of interest and value to all Government servants.

From the foreward by Major-General Bradfield it is noted that a handbook on the Indian Medical Service was published in 1890 and the next publication of this type was in 1912. The present handbook is published more than a quarter of a century later. It is incomprehensible to the reviewer that if the predecessors of this handbook were anything on the lines of the present publication that there was not a demand for more frequent issues of this type of book. It is to be hoped that revised editions will be issued periodically.

The book is divided into eleven well-arranged chapters dealing with recruitment into the Service, promotion, courses of instruction, leave, pay and allowances, passages, funds and ending with pensions. There are in addition seventeen appendices which contain a mass of useful information. This handbook will be of great value to all members of the Service. It should also find a place in the libraries of all medical schools where it will be of interest to all who aspire to enter the Service. There is only one thing that the reviewer would wish to add in a book of this type and that is a small chapter giving a brief outline of the history and the outstanding achievements of the Indian Medical Service.

C. L. P.

# Abstracts from Reports

REPORT OF THE DIRECTOR OF MEDICAL SERVICES, HONG KONG, FOR THE YEAR 1938

The year 1938 was marked by the prevalence and persistence of infectious diseases in the colony. At the end of 1937 smallpox had begun to attain epidemic proportions and the number of cases notified a maximum in March. The last case of this series was disease had died out.

Cholera resurred in Hann Kong in 1938 the first case

Cholera recurred in Hong Kong in 1938, the first case being notified on the 25th May. The disease was not measures of control which were adopted, and in part to the fact that the disease was expected and everything A readiness to combat an outbreak.

was in readiness to combat an outbreak.

A sudden sharp rise in the number of cases of epidemic cerebro-spinal meningitis was also noted was probably due to the fact that these people were colony and, being exhausted and ill-fed, succumbed to treadily.

Malaria, thanks to the malaria bureau, is no longer to be regarded as one of the major killing diseases in Hong Kong. Control is still essential as the infection rate remains high in rural areas which cannot be freed from breeding places, for economic reasons. The number of deaths recorded from malaria in 1938 is 733; this number includes two deaths from malaria among the forces of the Crown. No case of blackwater fever was recorded. Nine cases of filariasis and five of dengue were reported during the year. It is clear, therefore, that the incidence of mosquito-borne disease in Hong Kong is not excessively high.

No case of plague was recorded in Hong Kong in 1938: the infection appears to have been absent from the colony since 1929.

Typhus occurred in epidemic form in several parts of northern China during the spring months, but Hong Kong was fortunate in having only two cases during the year. One was a naval rating who appeared to have contracted his infection in Shanghai, twelve days before arriving in Hong Kong; the other was a young male refugee who developed the disease three days after arriving from Shanghai.

Approximately one out of eight of all deaths occurring in Hong Kong in 1938 was due to pulmonary tuberculosis, which killed 4,920 people in the year. It is probable that at least five people suffer from the disease for every one who dies of it, and the opportunities afforded for its spread by overcrowding are legion.

Dysentery was rife throughout the year and accounted for 338 deaths out of a total of 1,071 cases. There was no significant rise in the number of cases before the cholera epidemic began.

Numerous cases of typhoid fever were reported during the autumn months. The disease was in the majority of cases due to *Bacterium typhosum*, and killed 187 people out of a total of 539 cases. The months of maximum incidence were June and July, with 79 and 92 cases respectively.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF BIHAR FOR THE YEAR 1937. BY LIEUT.-COLONEL S. L. MITRA, D.P.H., I.M.S., DIRECTOR OF PUBLIC HEALTH

Comparative incidence of the chief diseases.—The undermentioned statement compares the ratios under the chief heads of mortality in 1937 with the average ratio of the previous ten years:—

1937. Of this total Rs. 4,10,688 was contributed by voluntary gifts, of which well over three and a half lag of rupees came from supporters in other countries in other countries in other countries every case, a voluntary service rendered without charge to the Mission to Lepers, this means that care of the lepers, and the maintenance of the local charges for superintendence is the reason why, with a little over eight lacs of rupees, the Mission was able to maintain 7,565 lepers resident in its thirty-four homes, and 834 healthy children of lepers brought up separately. It was also able to make grants-in-aid of substantial character to other homes with 2,270 leper inmates and 151 healthy children. The gross total of 10,820 compares with 10,590 on the same date in 1937, showing a continued increase of the numbers helped.

Much of the growth in the Mission's work during the last year has been in the care of greater numbers of children suffering from leprosy. At the end of 1937 there were 560 such children in our care; at the end of 1938, 678. This increase in numbers has, of course to be matched by the provision of increased accommodation. Just after Christmas last the new Dublin Ward for girls with leprosy in its contagious form was opened at Purulia, Bihar. This is a welcome addition to the special accommodation for children in this home.

	Urb	IN	Run	AL	COMBINED		
	Ten years' average			1937	Ten years' average	1937	
1	2	3	4	5	6	7	
Cholera Smallpox Plague Fevers Dysentery and diarrhœa Respiratory diseases Injuries All other causes	0.8 0.5 0.05 6.8 0.5 0.5 0.5 4.3	0.3 0.3 0.04 6.6 0.8 0.7 0.5 4.8	1.5 0.5 0.1 17.3 0.1 0.1 0.3 3.3	0.4 0.2 0.05 18.5 0.09 0.08 0.3 3.2	1.5 0.5 0.1 16.9 0.1 0.1 0.3 3.4	0.4 0.2 0.04 18.1 0.1 0.1 0.3 3.2	
TOTAL	14.1	14.0	23.4	22.9	23.0	22.5	

The death rate has increased from 21.7 in 1936 to 22.5 per mille of population in 1937. The increase in the number of deaths was due chiefly to comparatively larger number of deaths from cholera and fevers, the death rates from these being 0.4 and 18.1 as against 0.2 and 16.9 of the previous year. The highest death rate 18.1 was recorded from fevers. Deaths from malaria are included under the heading of 'Fevers' and as malaria prevailed in epidemic form in several districts of the province during the year under review, it is presumed that the increased death rate from fevers was chiefly due to greater number of deaths from this disease.

A REPORT OF THE SIXTY-FIFTH YEAR'S WORK IN INDIA AND BURMA OF THE MISSION TO LEPERS

September 1938 to August 1939

A COMPARISON of figures shows that the expenditure in India and Burma upon the Mission's work was Rs. 8,42,535 in 1938, as compared with Rs. 8,12,209 in

Last October saw the opening by the Minister of Health for Madras of a new home for healthy children at Vadathorasalur, releasing the old home for the use of children with leprosy, so that altogether some 130 children are being cared for at this station. At Cuttack the King George V Memorial wing for box with leprosy, and given by the people of the Province was opened in March this year by His Excellency the was opened in March this year by His Excellency the Governor of Orissa, and is already serving a fix useful purpose. And at Rawalpindi the erection of home for healthy children was just being completed as the period covered by this report closes.

Another encouraging feature of the year's work and the serving as the year's work and year year's work and year year's work and year year's work and year year.

Another encouraging feature of the year's work has been the success which has attended the first twelve months of the life of the new leper home at Zamuradanj, near Fyzabad, opened in August 1938. There is a considerable waiting list for admission, and there is a large out-patient department.

The main building work engaged in during the paragraph apart from the additions recorded in the paragraph touching on children's work, has been in the paragraph of the first part of a new hospital section wing Naini Leper Home, Allahabad. The women's block complete and the medical administration

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# OVRIL

# Remarkable Experiments at an English University

As long ago as 1911, the late SIR WILLIAM THOMPSON of Dublin established that Bovril has a unique power of ministering to nutrition. During last year a series of remarkable experiments were conducted at an English University which provided physiological explanation and proof. A group of medical students volunteered to undergo scientific dietetic tests, so that accurate studies might be made of the effect of certain beef preparations. One of the substances investigated was Bovril. As a result of these experiments\* Bovril was proved to be "The most effective stimulant." Briefly, it was shown that Bovril increased the supply of gastric juices where there was a deficiency and restored it to normal. It is an accepted medical fact that a lowering of the essential gastric activity is found in people of sedentary habits and poor muscular development. Bovril helps to rectify this and, by facilitating the digestion of proteins, enables full nourishment to be gained.

\*B.M.J., 1937 August 28. Page 412.

# THE IMPORTANCE OF PRECISION POLISHING

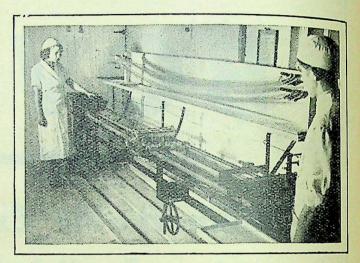
In order to obtain uniformity of calibre and complete roundness of strand along its entire length, A. & H. Catgut is polished by automatic machinery.

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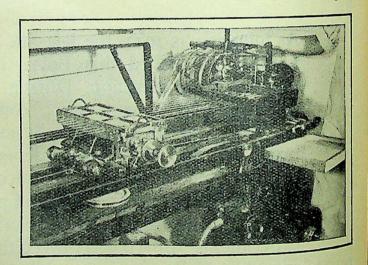
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quickly going up. Funds were also granted to enable an out-patient clinic to be provided at Sholinghur, and for another at Arkonam, both in the Madras Presidency. A grant was made towards the rebuilding of the aided A grant was part also in Madras, where the gradual content of the state of the grant was presented as a Narsapur also in Madras, where the gradual content of the gradual cont A grant was made towards the rebuilding of the aided home at Narsapur also in Madras, where the cyclone of November 1938 did great damage. The Assembly Hall at Kothara, Ellichpur, in Berar, has been enlarged, and an administration building provided. And at numerous homes small projects have been undertaken, use as extension of staff quarters or improvement of such as extension of staff quarters or improvement of water supply, which, though not large individually, make up in the total a considerable addition to the equipment of the homes.

The medical work of the Mission continues to give reason for a measure of encouragement. That 514 patients were discharged during 1938 with the disease arrested before deformity had begun (and a further period of six months passes during which the patient remains under observation after the last traces of activity have disappeared) is itself encouraging. At the same time the number of known relapses in 1938 from discharges in previous years—79—shows that 'arrest' is the proper term to use rather than 'cure'—a word which the Mission to Lepers has studiously avoided using during the years when optimism ran high, and claims were sometimes unguarded. The chief medical service which the Mission brings to the adult patient is, perhaps, by the fellowship and activities and regular conditions of living provided, which help to re-establish him into a life of happiness and usefulness, even within the bonds of his disease. For the children with only early marks of leprosy the Mission has evidence that it can do much more, enabling them to grow up into men and women who, with reasonable safeguards, should remain in good health. Its service to the community—and one which needs to be emphasized because it is often forgotten-is in saving the public from the risk of infection from the thousands of contagious cases to whom the Mission extends its hospitality.

ANNUAL REPORT ON THE MEDICAL INSPEC-TION OF SCHOOL CHILDREN IN SIX TOWNS OF THE NORTH-WEST FRONTIER PROVINCE DURING THE YEAR JULY 1937 TO JUNE 1938

THE scheme of medical inspection of school children was extended to the Mardan Municipal Town and the work was actually commenced from the 1st September, 1937, when the schools had re-opened after the summer vacation. The scheme was also extended during the year under report to seven rural schools in the Province.

The total number of boys medically examined during the year under report was 21,267 and the annual recurring expenditure amounted to Rs. 9,278-8. Accordingly the expenditure per boy comes to Re. 0-7-0 per annum as compared with Re. 0-7-2 per annum during the previous year. The decrease in the expenditure of two pies per boy per annum does not call for any

Out of a total of 16,808 cases recommended for treatment in the schools of the six municipal towns during the year 13,347 or 79 per cent actually received

In the girls schools in Peshawar City 552 cases were recommended for treatment and 388 or 70 per cent actually received treatment, while in the seven rural schools 887 were recommended for treatment and 737 or 83 per cent actually received treatment.

# Service Notes

### APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL R. V. MARTIN, C.I.E., to be Officiating A. D. M. S., Waziristan District. Dated 11th December, 1939.

Lieutenant-Colonel A. C. L. O's Bilderbeck to be O. C., C. I. M. H., Bannu. Dated 21st November, 1939. Lieutenant-Colonel R. A. Warters to be O. C., I. M. H., Bangalore. Dated 11th December, 1939. Lieutenant-Colonel H. M. Strickland to be Specialist in Radiology, Lahore District. Dated 28th December, 1939.

Lieutenant-Colonel S. M. Hepworth to be Specialist in Radiology, Madras District. Dated 30th November,

Lieutenant-Colonel G. R. Oberai, Superintendent, Central and District Jail, Benares, transferred to Central Jail, Naini, Allahabad, vice Major R. N. Bhandari

Lieutenant-Colonel H. E. Murray, on return from leave, is appointed as Civil Surgeon, Hooghly, vice Captain E. H. Lossing.

Lieutenant-Colonel S. Nag (on leave) is appointed be Civil Surgeon, Murshidabad, vice Dr. Sita Nath Ghosh, transferred.

Major C. A. Bozman is appointed as Port Health Officer, Bombay, with effect from the 4th October, 1939.

Major G. Y. Thomson to be Specialist in Ophthal-mology, Deccan District. Dated 28th November, 1939. Major S. S. Bhatnagar, an officer of the Medical Research Department, is appointed as a leave reserve officer under the Central Government, with effect from the 24th December, 1939 (forenoon), and is attached to the Haffkine Institute, Bombay, as a Supernumerary officer. Major R. McRobert, Civil Surgeon, Monywa, on

transfer, relinquished charge of his appointment on the forenoon of the 27th January, 1940.

On completion of the period of his probation, Captain S. P. Bhatia is confirmed in his existing appointment as Deputy Assistant Director-General (Medical Stores), Calcutta, with effect from the 20th June. 1939 June, 1939.

Captain C. L. Greening is transferred to the Civil Branch of the Indian Medical Service, and is appointed to the Medical Research Department on probation for 2 years, with effect from the 20th December, 1939 (forenoon), and is posted to the Central Research

Institute, Kasauli, as a leave reserve officer under the Central Government.

Captain L. S. F. Woodhead is transferred to the Civil Branch of the Indian Medical Service, and is appointed to the Medical Research Department, on probation for Service with effect from the 21st December 1 probation for 2 years, with effect from the 21st December, 1939 (forenoon), and is attached to the Pasteur Institute, Shillong.

Captain R. L. Haviland Minchin, a leave reserve officer against the Central Indian Medical Service

Cadre, is appointed Assistant Director, Central Research Institute. Kasauli, with effect from the 23rd December, 1939 (forenoon), vice Major S. S. Bhatnagar,

transferred.
Captain V. M. Albuquerque to be Specialist in Surgery, Presidency and Assam District. Dated 26th December, 1939.
Captain E. H. Lossing, on relief, is appointed as Civil Surgeon, Rajshahi, vice Dr. Satya Charan Sen.

#### LEAVE

Lieutenant-Colonel S. L. Bhatia, M.C., Principal, Grant Medical College, and Superintendent, J. J. Group

of Hospitals, Bombay, has been granted leave on average pay for 2 months in India, with effect from the forenoon of 15th January, 1940. Major J. H. Boultbee on further extension of sick leave up to 30th April, 1940.

#### PROMOTIONS

The undermentioned Indian Medical Service Officer is advanced to the List of Special Selected Lieutenant-

Lieutenant-Colonel E. W. O'G. Kirwan, C.I.E. Dated

17th October, 1939.

Brevet-Lieutenant-Colonel to be Lieutenant-Colonel A. H. Craig. Dated 23rd December, 1939.

Captains to be Majors

S. W. H. Askari. Dated 3rd January, 1940. Hoe Min Sein. Dated 26th January, 1940. A. E. Kingston. Dated 1st February, 1940. G. K. Graham. Dated 3rd February, 1940. A. W. West. Dated 3rd February, 1940.

(Short Service Commission) Lieutenants to be Captains

I. Singh. Dated 12th January, 1940. D. Bhatia. Dated 12th January, 1940. N. D. P. Karani. Dated 12th January, 1940. Nowshir Jungalwalla. Dated 1st February, 1940. Dharam Dev Varma. Dated 1st February, 1940. H. Rees. Dated 27th September, 1939, with seniority

from 1st May, 1938.

Lieutenants (on probation) to be Captains (on probation)

Dated 27th September, 1939, with seniority from 1st November, 1938

S. G. Nardell. K. D. Fraser.

D. H. Harrison.

Dated 27th September, 1939, with seniority from 1st May, 1939

G. S. Michelson. J. Aitken.

P. J. Wormald. G. T. M. Hayes. J. P. O'Riordon.

Kent.

R. O. Yerbury.

Dated 19th October, 1939, with seniority from 1st September, 1939

A. S. Brown.

#### RETIREMENTS

Colonel W. E. R. Williams, O.B.E., K.H.S. Dated 29th January, 1940.
Colonel R. S. Townsend, M.C. Dated 10th Novem-

ber, 1939.

# Note

#### RETRACTOR STAND

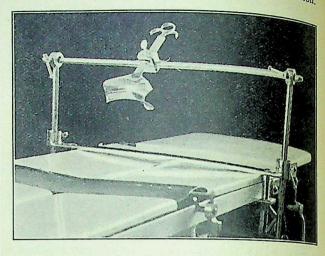
THE 'retractor stand' shown here was specially made for me by Powells Limited, Surgical Instrument Makers, Bombay; I have devised this stand for deep pelvic and other abdominal operations.

In deep pelvic and other abdominal operations, in which both a firm hold and a large field of vision are required, this stand obviates the need for the services of a third assistant, holding a retractor.

There is already on the market a stand which is placed between the legs of the patient, but in actual practice it is uncertainty.

practice it is unsatisfactory in several ways. For instance, it greatly interferes with the proper arrangements of sterilized towels, and causes unnecessary pressure in the patient's groin. It also prevents the

passing of a catheter or rectal or vaginal instrument, passing of a carrieter of the course of an operation



The new stand does away with all these difficulties, and greatly facilitates surgical manœuvres.

J. R. PARAKH, M.D., M.R.C.S.

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The Editors of The Table 1997 and 199

The Editors of The Indian Medical Gazette cannot lyise correspondent advise correspondents with regard to prescriptions diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette. Original Articles

COMPARISON OF THYMOL AND SOME OTHER DRUGS IN THE TREATMENT OF HOOKWORM INFECTION

By P. A. MAPLESTONE, D.S.O., D.Sc., M.B., B.S., D.T.M. and

A. K. MUKERJI, M.B.

(From the Helminthological Research Laboratory, School of Tropical Medicine, Calcutta)

Up to a little more than twenty-five years ago thymol was the only efficient drug at our disposal for the removal of hookworms. Since then there have been successively introduced beta-naphthol, oil of chenopodium, carbon tetrachloride, tetrachlorethylene and hexylresorcinol, all of which have had their advocates, but in common with thymol none of them are free from certain disadvantages, and it is in the assessment of the disadvantages against the efficiency of these various drugs that considerable disagreement has arisen.

Lane (1935), who, from his published work, seems to have had personal experience with thymol only, reviewed most of the important work on these anthelminthics published up to that date and his main conclusion is as follows: 'It seems to leave thymol in the first place, especially when safety and efficiency are both considered, it being again stated emphatically that safety must have the first place'. He also says :- 'The bulk of what has been offered as evidence for appraising hookworm-killing drugs has been reached in non-comparable ways', and he ends his paper by expressing the hope that its publication will lead to the collection of further evidence based on strictly comparable results. The same author (1936) covered the same ground in slightly more popular language, but neither of these papers appears to have induced anyone in a position to do so to carry out such a series of comparative observations. Possibly most workers with experience of the post-thymol drugs did not think it worth while following Lane's suggestion. Although not in agreement with much of what Lane said, we felt that at least his criticism of the absence of strictly comparable results in assessing the value of these anthelminthics was justified. Accordingly very soon after the publication of his first paper we commenced a comparative investigation of some of the drugs reviewed by him and have only recently completed the work.

The reason this work took so long to complete was that we wished to make our results as definite as possible, and to ensure this several factors had to be taken into account.

It was considered advisable to include only those persons who had an appreciable hookworm infection because very light infections are usually much more easily eradicated than heavy

ones. We decided upon an egg count of 1,000 eggs per c.cm. of stool as the standard of infection that must be reached and in only two cases were lighter infections included. The number of heavily-infected persons in Calcutta is small, so it took us a long time to collect sufficient for our

Another necessity was that the patients had to be willing to come into hospital and to remain for an indefinite period, which still further extended the time of these observations.

There were three reasons why we only considered in-patients :--

(a) There was no chance of reinfection during the period of observation.

(b) The stools could all be saved after treatment and thus the species of all the worms passed could be determined. This is important because all the evidence available points to the fact that ancylostomes are more difficult to eradicate than necators, and as we have both species in Calcutta it was felt that our results might be weighted, either favourably or unfavourably, in respect of any of the drugs used, if the species of all the worms removed were not known.

(c) Daily examination of the stools by D.C.F. was possible, and this was carried out from the day after treatment in every case for as long as was required, and this method of examination was supplemented by egg counts, when the latter were indicated according to our plan of investigation.

On account of the difficulties in obtaining enough patients in a reasonable time we have confined our investigation to three of the drugs discussed by Lane. Even limited in this way the work has taken over three years, and if all the drugs had been included this period would have been extended to several years more. This was considered unjustifiable in view of the probably slight value of the extra information that would have been acquired, and so we have confined our comparison of thymol with the two drugs, which from our personal experience, we consider most worth while. The drugs we have tested are thymol, tetrachlorethylene alone and tetrachlorethylene and oil of chenopodium given

Carbon tetrachloride has not been tested because it is undoubtedly more dangerous than tetrachlorethylene, and our own earlier investigations carried out with these two drugs on comparable lines showed that there was little to choose between them regarding efficiency (Maplestone and Mukerji, 1929, 1933, and 1937).

Oil of chenopodium alone has not yet been examined, but our figures given in this paper when it is used with tetrachlorethylene, compared with those achieved by tetrachlorethylene alone, suggest it is not as good as other workers have claimed. However, we do not feel prepared to dismiss it as Lane (1935) has done with the remark, 'I can find no acceptable published

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evidence of its efficiency against hookworms', and we have already commenced a series of treatments with it, carried out on exactly the same lines as have been followed in this paper, the results of which will be published in a supplementary paper.

Hexylresorcinol was found by us (Maplestone and Mukerji, 1932) to be so inefficient in the few cases in which we tried it that, coupled with its relatively high cost and the need for preliminary restriction of diet in the patient, we do not consider it worthy of consideration against the other

anti-hookworm drugs available.

Beta-naphthol has not been tried because we agree with Lane (1936) that it is inefficient in safe doses and toxic in doses sufficiently large to remove the majority of worms. In any case, this drug has never been widely used for this purpose.

Methods of administration of the drugs

Thymol.—Lane has pointed out that much of the disrepute into which this drug has fallen may be accounted for by the fact that it has been given in large crystalline lumps and not finely divided and mixed with a suitable excipient to prevent it again adhering into a single mass after division, because it has been shown that this measure greatly improves its efficiency. The two excipients recommended by different workers are sodium bicarbonate and lactose. We used both of these together, taking ten grains of sodium bicarbonate in all cases and adding to it enough lactose to make the mixture equal in weight to the dose of thymol being given in each case. This was done shortly before the administration of the drug, and the prepared mixture was placed in as many hard gelatin capsules as were needed to contain the dose. The dose was given in two parts with an interval of one hour and a half between them and followed one hour and a half later by a dose of two ounces of saturated sodium sulphate solution. The stools were always searched for the capsules to make sure they had opened in the intestinal tract. It should be noted that none of our cases received the full dose of 60 grains recommended for adults, because all of them were debilitated and under-weight, so the dose for each person was calculated to the nearest grain on a basis of 60 grains of thymol for 150 pounds of body-weight, which is a more accurate method of administering drugs, in which the dose must be limited for safety, than to base the dosage on years of age. This method of graduating the dose is recommended by Chopra and Chandler (1928) who based their recommendation on an age-and-dosetable compiled by Ashford and King, two authorities who probably had a wider experience of thymol than anyone else.

Tetrachlorethylene.—The whole dose was shaken up in two ounces of saturated solution of sodium, sulphate and administered immediately, before it had time to coalesce again into larger masses as it rapidly does if left at rest.

Our idea in shaking the mixture in this way is that something the same effect as particulation of thymol is effected, and our opinion of the efficiency of tetrachlorethylene being thereby increased is based on our relatively poor results with this drug when we first used it and gave it in the soft gelatin capsules in which it was supplied, compared with our later results when we received it in bulk and could pour it direct into the sodium sulphate solution. Lane (1935) argues that our reasoning is unsound because he found that 4 c.cm. of tetrachlorethylene shaken up with two ounces of saturated sodium sulphate solution begins to separate out in ten seconds and nearly all had collected at the bottom of the flask in one minute. We have not been able to observe what goes on inside the stomach when a dose shaken up as we recommend it is swallowed, but we feel certain that the conditions in an actively motile and warm organ such as a normal stomach, which probably contains some food and mucus as well, is hardly comparable to the conditions in a glass flask standing motionless on a table at room temperature with nothing in it but the sodium sulphate solution and tetrachlorethylene. Such a criticism appears inconsistent with Lane's frequent insistence on strictly comparable conditions being a necessity before one can draw sound conclusions on the comparative value of two different observations.

The full dose of 4 c.cm. was given to all the persons in this series because our experiments on cats (Maplestone and Chopra, 1934) added to many years' practical experience in the use of this drug have led us to the conviction that this amount is so far below the dangerous limit that it can be given with perfect safety to adults who are well below the usually-accepted normal

body-weight

Tetrachlorethylene and oil of chenopodium.—
These two drugs were shaken up in two ounces of sodium sulphate solution and given immediately in the same way as tetrachlorethylene alone. The dose given was 4 c.cm. of tetrachlorethylene and 1 c.cm. of oil of chenopodium. The oil was stated to be of British Pharmacopæis standard, which was confirmed for us by a skilled chemist.

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Methods of observation of cases

Before undergoing treatment egg counts by Stoll's technique were made. We used a slight modification of Stoll's original method which we find gives better results. We take twice the amount of decinormal sodium hydroxide that Stoll does for diluting the stool, which is 1 c.cm. by cubic capacity instead of 1 gramme by weight, and the number of eggs found in two counts of the preparation are added together and multiplied by 100 to give the estimated egg content.

Cases were treated by the three drugs in rotation as they occurred, without any selection. The complete stools passed for forty-eight hours after every treatment were saved and all

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the worms passed collected and identified. This was done in all but two cases in one of which the stools were not saved and in the other no worms were found although it was apparently cured. These, as well as a few cases in which some of the worms were so broken as to be unidentifiable, are shown in the protocols.

From the day following treatment the stools were examined every day for ten days by D.C.F. if they did not show eggs sooner. If consistently negative for this time the case was classed as cured, but if it again became positive and showed an estimate of more than 100 eggs per c.cm. of stool it was again treated a fortnight

after the previous treatment.

Unfortunately treatment could not be continued in every case until it was completely cured, because the demand for beds in our hospital is so great that they could not be accommodated for a sufficiently long period. Accordingly an arbitrary standard of reduction of infection was decided upon, below which no further treatment was given. As this was the same in all three series the uncured cases can be compared as well as the cured ones. Cases which showed not more than four eggs in a D.C.F. preparation were not treated again, and if there were more than four eggs by this method a dilution count was done. If no eggs were found in two preparations the case was classed as 'under 100 eggs' and if one egg was found in two preparations it was classed as '100 eggs' (per c.cm.). Neither of these classes were again treated, but every case that showed more than one egg in two counting preparations was again treated and the actual count was not recorded.

Intensity of infection

It will be seen in the table that the intensity distribution of infections, as indicated by egg counts and irrespective of species of worm, that the thymol group had nine cases with over 10,000 eggs per c.cm. compared with five in the tetrachlorethylene and 11 in the mixed treatment groups, that with between 9,000 and 1,000 eggs there were 14, 20 and 14 cases respectively, and that there were only two with less than 1,000 eggs, both in the thymol group. Although at first glance it might appear that the thymol group was the more difficult to cure compared with the tetrachlorethylene group on account of the higher number of heavy infections in it, comparison with the mixed treatment group especially, and the almost complete absence of any evidence of correlation between intensity of infection and number of treatments needed to effect a cure in all three groups, indicates that there is no significant difficulty ficant difference regarding the probable difficulty in effecting a cure in the three groups.

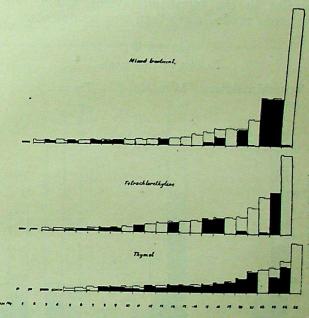
Species of worm

In those cases which had more than two treatments the total number of which additional treatments (whether 3rd, 4th or 5th) was 44, only treatments only two necators were passed, one male in one

case and one female in another, both in the thymol group. After the same 44 treatments one or more ancylostomes were passed after 35, and after nine no worms of either species were seen. This accords with the generally-accepted view that ancylostomes are more difficult to get rid of than necators. With the limited number of figures available it is not possible to make any statistical estimate of the probable difference between the two worms in this respect. It is accordingly proposed to compare the three groups chiefly with regard to the intensity of infection and number of cases infected with ancylostomes only and to lay little stress on necators; the degree of infection in this portion of the paper is estimated by the actual number of worms found in the stools after treatment.

### GRAPH 1

Species distribution of worms in individual cases in the three groups.



= Ancylostomes.

= Necators.

Note.—One case was cured but no worms were recovered in the mixed treatment group.

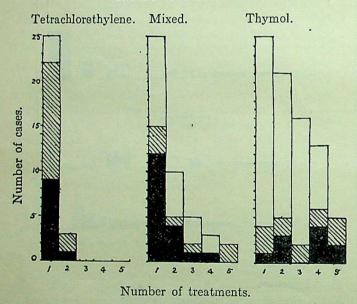
The stools were not saved in one case in the tetrachlorethylene group.

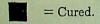
In the thymol group there were 17 infected with ancylostomes and 15 in each of the other groups: in one tetrachlorethylene group case the stools were not saved and in one mixed treatment no worms were found though the case was cured by one dose of anthelminthic.

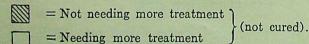
It is evident from graph 1 that thymol had to deal with a larger number of fairly heavy ancylostome infections than either of the other groups although the three heaviest infections were in the latter. Even if it is admitted that on this account thymol appears in a less favourable light in comparison with the other forms of treatment, the differences are not sufficiently great to account wholly for the great difference

in the results. This is borne out by more detailed examination of the protocols. In the first place only one case was cured by one treatment in the thymol group and only three others were reduced sufficiently not to need further treatment, and in this group there were eight pure necator infections. Further, after three treatments, all except four of which were with thymol, five cases remained which required one or two additional treatments to effect a cure or to bring them to the no-further-treatment level. Examination of the tetrachlorethylene group shows that this drug cured nine in one treatment and that five of these had ancylostome infections, also an additional eight had ancylostomes out of 13 which were brought to the no-furthertreatment level by one treatment. This left only three needing a second treatment and of these one was cured and the other two were brought to the no-further-treatment level; the mixed treatment group is in some respects superior to the tetrachlorethylene group, but five cases needed more than two treatments.

GRAPH 2
Results of treatment.







The difference in results is just as clearly shown in another way in graph 2. Expressed in figures this reveals that in the tetrachlorethylene group a total of 28 treatments cured ten cases and reduced 15 to the no-further-treatment level, the mixed treatment needed 45 to cure 18 and bring seven to the no-further-treatment level whereas in the thymol group 80 treatments were needed to cure ten and bring 12 to the no-further-treatment level. In this last group one case left hospital after three and two cases after four treatments with egg counts of over 1,000 eggs

per c.cm., so that at least 83 treatments would have been necessary to bring all the cases to the same level as those of the other two groups. It must be recorded that 22 of the subsequent treat ments in the thymol group were not with thymol because, in four cases after two treatments and in all the others requiring them after three treatments with thymol, one or other of the alternative forms of treatment were given. The same thing applies in the mixed treatment group where thymol was given in four and tetrachlorethylene in two supplementary treatments\*. In view of the greater efficiency of the other treatments which has been demonstrated above, it is not considered likely that they were less effective than thymol would have been in these cases so the much greater number of treatments needed in this group can be taken as further evidence of the relative inactivity of thymol. The fact that in six out of 11 cases more worms were passed after a dose of tetrachlorethylene than had been passed previously after a third dose of thymol can be interpreted in one of two ways. either that these worms had become 'fast' to thymol or that it again shows the superiority of tetrachlorethylene.

#### Discussion

In assessing our results it may be argued that we did not use 60 grains of thymol in a single case whereas we did use 4 c.cm. of tetrachlorethylene without exception. The reason we reduced the dose of thymol was not to decry its value but we were guided by the opinion of Ashford (than whom none had wider experience in its use) that for safety the dose of thymol must be carefully regulated. We were dealing with adults, but their weight was so much below the usually-accepted normal of 150 pounds that they had to be regarded as under age from the point of view of therapeutics, because this method of calculating dosage is now recognized as much more scientific than to use age in years, particularly in illiterate persons whose state ment of their ages is often most unreliable With regard to tetrachlorethylene we had out own experience of many years' use of the drug on human beings as well as our pharmacological work on cats which showed that the dose of 4 c.cm. is so far below the dangerous limit that it is not necessary to reduce the dose in adults however low their weight may be. In addition to our own experience a good deal of other evidence of the cofet evidence of the safety of tetrachlorethylene has now accumulated and so far the only case

<sup>\*</sup>The reason this was done is that we hold the view that after two or three ineffective treatments with a drug some hookworms appear to become resistant of fast' to it. This conclusion was arrived at some years ago when we were experimenting to see if we could ago when we were experimenting to see if we reduce the dose and retain the efficiency of carbon this chloride, in the interests of safety. We found this after two or three ineffective doses of 1 c.om. after two doses of 3 c.cm. appeared to be one inefficient. As the research failed in its primary object this observation was never published.

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ued that a single trachlorason we decry its inion of perience thymol dealing ch below nds that from the use this ecognized in years, se state nreliable. had our the drug

cological dose of imit that in adults addition of other ylene has nly case the view ats with a

esistant or some years we could rbon tetra ound that me of this equally be equally

reported of its apparent dangerous toxic effects is that of Kendrick (1929) in which the serious symptoms rapidly passed off. As it is now over ten years ago since this isolated case was reported and no similar ones have since been recorded it seems reasonable to look on it as unique and of no real importance as an argument against the safety of tetrachlorethylene. Therefore we consider if the necessity for safety (stressed by Lane in the quotation given from

recommended by the greatest authority on its

There are other factors also worthy of consideration. The cost of tetrachlorethylene is Rs. 2 per pound, or less for a large quantity, whereas thymol is Rs. 7 or more a pound\* and as the full dose of these drugs is practically the same the advantage of tetrachlorethylene in this respect needs no discussion. Further, the sodium bicarbonate and/or the lactose and the

# Intensity distribution, shown by egg counts

Eggs per c.cm. of stool	Over 20,000	19,999 to 10,000	9,999 to 9,000	8,999 to 8,000	7,999 to 7,000	6,999 to 6,000	5,999 to 5,000	4,999 to 4,000	3,999 to 3,000	2,999 to 2,000	1,999 to 1,000	Under 1,000	Total
Thymol Tetrachlorethylene Mixed treatment	5 2 2	4 3 9	0 0 0	0 1 1	2 3 1	1 1 0	1 0 0	1 3 2	3 3 2	3 2 3	3 7 5	2 0 0	25 25 25 25

# Cases given tetrachlorethylene alone; the dose in all instances was 4 c.cm.

								was I c.em.	
Number	Egg count Worms Pass		FIRST	AFTER	S PASSED SECOND FMENT	TOTAL	WORMS	Result	Remarks
		Nec.	Anc.	Nec.	Anc.	Nec.	Anc.		
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	1,200 1,300 1,400 3,800 4,800 1,000 6,000 3,700 7,000 1,400 8,400 20,500 2,900 2,900 7,900 1,900 3,300 16,400 1,200 4,200 7,300 19,000	19 16 106 81 99 14 2 70 137 682 223 5 297 11 114 ?	 1 16 130 20 31 6 * 1 89 18 8 29 6 36 125 ?			19 16 106 81 99 14 2 70 137 682 223 5 297 11 114 ?	1 16 130 20 31  6 1 89 18 8 29 6 36 125 ?	Cured  "" "" "" "Not cured  "" "" "" "" "" "" "" "" "" "" "" "" "	1 egg by D. C. F.  1 " " " 4 eggs " Count under 100     " " 100 2 eggs by D. C. F. 2 " " " 1 egg " " 1 " " " 2 eggs " " (stool not saved).
25	15,500 25,400		44 340	18	16 20	44	60 360	Not cured	2 eggs by D. C. F. 2 ,, ,, ,,

The cases in all the groups have been arranged in order according to the ease with which they were cured, therefore they also give a graphic representation of the results.

\* Instances in which some worms were too broken to be identified.

his writings at the beginning of this paper) is accepted, as it should be, tetrachlorethylene fully comes up to his demands, as it appears to be even safer than thymol and there appears to be no doubt about its greater efficiency, when the dose of thymol is kept within the limits

gelatin capsules are all to be added to the cost of thymol, and a third factor in increasing its expense is that a considerable amount of time (Continued at foot of page 200)

<sup>\*</sup> These are pre-war prices in Calcutta.

Cases given mixed treatment, tetrachlorethylene and oil of chenopodium

The same							O.F.o.F.O.
		Remarks	Count under 100,	1 egg by D. C. F	4 eggs " "		Count under 100.
		Result	Cured "" "" Not cured ""	Cured " " Not cured	Cured Not cured	Cured	Not cured
	VL AIS	Anc.	22 22 24 24 24 24 25 39	411 27 52	18	32	28 415
	TOTAL	Nec.	222 30 30 277 277 46 49 68 68 69 10 10 10	41 41 6	1,181	2	10
	Worms	Anc.		1 ::::	: :	i	; ro
	WC	Nec.	:::::::::::::::::::::::::::::::::::::::	:::::			
		5th treatment ´	:::::::::::::::::::::::::::::::::::::::	: ::::	:::		Repeat thymol. Repeat C <sub>2</sub> Cl <sub>4</sub> .
	MS	Anc.		: ::::			21 21
	Worms	Nec.	:::::::::::::::::::::::::::::::::::::::	: ::::			::
The state of the s		4th treatment	:::::::::::::::::::::::::::::::::::::::	: ::::		Thymol grs. 49	Thymol grs. 42 GrCl.
	MS	Anc.	:::::::::::::::::::::::::::::::::::::::	: ::::	8 4		= :
	WORMS	Nec.	:::::::::::::::::::::::::::::::::::::::	: ::::	::		::
		3rd treatment	:::::::::::::::::::::::::::::::::::::::	: ::::	Repeat treatment.	a	Thymol grs. 56
	MS	Anc.	:::::::::::::::::::::::::::::::::::::::	111 112 * 15 *	: 73	:	67 10
	Worms	Nec.	:::::::::::::::::::::::::::::::::::::::	: ::::	36	•	::
		2nd treatment		Repeat treatment. "	a a	a	
	MS	Anc.		. :	13	32	13
	Worms	Nec.	222: 23: 25: 25: 25: 25: 25: 25: 25: 25: 25: 25	93	1,155	2	10 :
	1st	treat- ment	d oil of chenopodium I c.cm.	hylene 4 c.cm. an	tetrachloret	soses	
	• [	Ligg	2,000 1,600 1,600 1,600 1,500 1,300 1,300 1,300 1,300 1,300 1,300 1,300 1,300 1,300 1,300 1,300 1,300 1,300 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500 1,500	18,100 3,600 47,700 23,700 4,200	16,900	2,800	10,700
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		Remarks	2 eggs by D. C. F. 3 2," t "nder 100.	4 eggs by D. C. F. 2	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Count 1,400 refused to stay.	Count under 100.  " "100 refused to stay. Discharged (had leprosy).	Count 100. " 100. " 100.
		Result	Cured Not cured	Cured " Not cured	a	"Cured	Not cured "	Cured Not cured
	AL	Anc.	co :::	:::::	40 94	138 40 68	26 226 122 39 33	S3 62 63 181 53
	Total	Nec.	130033	2 200 21 425 27	19	17 3	20 47.	15 15
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	Worms	Nec.	::::	: ::::	::	: ::	:::::::::::::::::::::::::::::::::::::::	:::::
	5th	treat- ment	.::::	: ::::		: ::	:::::::	C'Cl
	Worms	Anc.	::::	: ::::	:::	38	-=-4= :	111 8: 8
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dasce he	Worms Passed	Anc.	::::	e: :::::	36	68 ::	:0888 0	- <del>4</del> -8-
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	$\Box$	Nec.	33	2 185 5 425 21	19 2	3 1 2 3	20 :: :: :	:::۳۵
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		in Ib.	288 86 73	121 112 90 112 96	142	87 125 87	84 101 107 90 93	46 02 12 28 12 12 12 12 12 12 12 12 12 12 12 12 12
		count	1,600 1,700 500 2,000	900 2,800 1,000 12,400 3,300	16,100 6,200	25,000 5,000 10,300	2,000 2,000 2,000 20,000 39,600	4,100 7,900 3,400 16,408 27,700
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HAFFKININE (ACRIQUINE), AN ATEB-RIN-LIKE COMPOUND PREPARED IN INDIA, IN INDIAN STRAINS OF MALARIA

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Since the discovery of the antimalarial properties of atebrin and its successful use in

(Continued from page 197)

of trained dispensers would be occupied in preparing a large number of doses. Against this, tetrachlorethylene requires no excipients nor capsules and it can be rapidly and accurately measured by anyone with ordinary intelligence but with no special training as a dispenser\* A final advantage of tetrachlorethylene, according to our method of treatment, is that it is mixed directly with the dose of purgative, shaken up and given immediately in a single dose, whereas thymol is given in one or two portions, which are followed in an hour or two by the purgative, so that the time taken to complete the treatment with this drug is much greater than that occupied in giving tetrachlorethylene.

Accordingly our final conclusion is that tetrachlorethylene is a better drug for the treatment of hookworm infection on the grounds of lower toxicity, lower cost, greater ease of dispensing, less time taken in completing a treatment, and

greater efficiency.

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the routine treatment of malaria, efforts have been made in other countries to prepare acriding derivatives of a similar nature and with similar properties. In France, 'quinacrine', a compound with the same constitutional chemical properties. In France, 'quinacrine' formula, was prepared and successfully tested while in the Union of Soviet Socialist Republics 'acriquine' a similar compound was synthesized A comparative study of the actions of these two compounds on malarial infections reveals no difference. They destroy all the stages of the three species of malarial parasites with the exception of the gametocytes of P. falciparum, Like atebrin these compounds are mainly excreted through the kidneys and traces of them were found in the urine for a considerable period.

Recently, workers in the Haffkine Institute Parel. Bombay, have prepared a similar acridine derivative the therapeutic efficacy of which has been tested by us on a series of eight cases in the Carmichael Hospital for Tropical Diseases. The compound was at first called 'Haffkinine' but this name has now been changed to 'acriquine' and in this paper we have given the

summary of results of these trials.

After the patients were admitted into the hospital a thorough physical examination was carried out; the peripheral blood was examined and a rough estimate of the number of parasites, both sexual and asexual, was also made. Except in urgent cases, the patients were put on a simple alkaline mixture and the antimalarial treatment was not started until the parasitic counts were fairly constant for two or three consecutive days. The pulse rate, blood pressure and respiration were recorded. Daily counts of parasites in the peripheral blood during this period enabled us to watch the progress of the patients and gave us information with regard to the intensity of the infection and the action of the drug. If parasites in the peripheral blood were scanty, these were allowed to increase till the count was fairly advanced, and rigors and other symptoms were pronounced before the drug was administered. 'Haffkinine' (acriquine) was given by the mouth in powder form, one tablet, containing 0.1 gramme, being given three times a day for five consecutive days. two cases, however, it was administered in gelatine capsules. No other drug was given except a light purgative whenever necessary. Daily restrictions regarding diet were observed. examinations of blood were carried out for malaria parasites during the course of treatment, and a rough estimate of the number of parasites was also made where

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After the completion of the course the patients were carefully observed in the hospital for a fortnight deily observed. fortnight, daily examinations of the blood being made for malarial parasites. Cultural examinations of the lives tions of the blood for malarial parasites were made where this made where thin and thick films were negative.

Details of eight cases are given in the table study of the table A study of the table will show that,

<sup>\*</sup>An accurate and efficient measure for dispensing tetrachlorethylene is an old-fashioned type of hypodermic syringe of 5 c.cm. capacity, which has a screwnut on the plunger-bar to limit the excursion of the plunger so that any desired amount of liquid less than 5 c.cm. in volume can be automatically measured. In the present instance the screw is adjusted so that only 4 c.cm. can be drawn into the syringe. Used without the needle attached, accurate doses can be measured in this way and expelled into already prepared doses of the purgative with the greatest rapidity.

TABLE

	Dage Sex	FINDING			Fini	OINGS	OF I	PARAS	ITES EATM	DURII ENT	NG A	ND	Duration of		
Num- ber	Race, Sex and Age	Species	As.*	Sex.	2nd day 3rd d		day 4th day		5th day		fever in days after beginning of treatment	REMARKS			
					As.	Sex.	As.	Sex.	As.	Sex.	As.	Sex.			
1 2	E., M., 38 H., M., 30	МТ ВТ& МТ	Sc. 1,000	0	0 1,000	0 0	0 200	0 Cr.		O Cr.	o Sc.	O Cr.	1 3	Crescents persisted.	
3 4	O.C., M., 22 I.Ch., M., 3	B T M T	Sc. 900	Sc. Sc.	Sc. 500	Sc. Sc.	Sc. Sc.	Sc. Sc.	o Sc.	o Sc.	o Sc.	o Sc.	3 4	1/3 the adult dose given	
						Trans								forms disappeared on the sixth day. Cres-	
5 6	H., M., 20 H., M., 32	MT MT (Rings).	Sc. Sc.	0	Sc. Sc.	0	Sc.	0	0	0	0	0	2	cents persisted. Induced malaria. Temperature persisted,	
7	O.C., F., 12	MT	Sc.	0	Sc.	0	0	0	0	0	0	0	2	chronic cough.  Drug given for four days.  No relapse within six	
8	H., M., 22	ВТ	1,750	450	650	350	950	225	Sc.	0	0	0	3	weeks.  No relapse within nine weeks.	

Note.—The figures given, indicate parasite per 500 leucocytes. Sc. indicates 'scanty', i.e., less than 200 per 500 leucocytes. Cr. indicates scanty crescents.

\* As. = Asexual forms.

temperature came down to normal within one to four days and the peripheral blood was free from parasites within two to five days. The drug destroys all the forms of malaria parasites excepting the gametocytes of P. falciparum. Its action closely resembles that of atebrin and other acridine derivatives. Unfortunately, we had no case of quartan infection in the hospital during the period of this investigation. Rigors were seldom observed on the third day of the administration of this drug. In mild cases of benign tertian infection, if treatment with this drug was started on the day of the rigor, the next rigor was sometimes manifested in the form of a chilly sensation only. The effects of the drug on blood pressure, pulse rate and respiration were recorded; no marked changes were noticed. Haffkinine (acriquine) was mostly excreted by the kidneys and appeared in the urine on the second day of its administration, and traces of it were detected up to 25 days or even longer. A slight yellow tinge, which passed off after a few days, developed in the skin of some of the cases. There was rapid reduction in the size of the spleen in cases of acute infection, but in long-standing cases where the spleen was hard the decrease in size was more gradual and the organ often took a considerably longer time to come back to its normal size. In spite of the fact that Haffkinine persisted in the body for a fairly long time, no marked untoward symptoms was comtoms were noticed. One or two cases complained of slight pain or a sensation of uneasiness in the ness in the epigastric region and loss of appetite,

but these symptoms passed off with the stoppage of the medicine.

#### Summary and conclusions

- (1) Haffkinine or 'acriquine', an acridine derivative prepared in India, is an effective drug in the treatment of Indian strains of malaria. The drug is effective in doses of 0.1 gramme three times a day, the course lasting for five days and taking a total of 1.5 grammes of the drug for the cure.
- (2) Haffkinine (acriquine) in this small series of cases appeared to behave in the same way as atebrin would have done.

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## CRINODORA (PALUSAN) IN INDIAN STRAINS OF MALARIA

By R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)

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AFTER the synthesis and successful trials of atebrin in the treatment of malaria, a number of acridine derivatives closely resembling it in chemical composition and properties were prepared. In France, 'quinacrine' was synthesized and in the U.S.S.R. 'acriquine'. Soon after, S. A. Farmaceutici Italia Milano synthesized a similar compound which they called 'Palusan' and later 'Crinodora', the chemical composition of which, as stated by the manufacturers, is the same as that of atebrin. As the supplies of atebrin in India from German sources have been stopped on account of the outbreak of war, we undertook to test this drug in the treatment of infections with Indian strains of malaria, so that, if the acridine derivatives prepared in Italy resembled atebrin closely, use could be made of this source for the supply of another effective antimalarial drug in this country.

The investigation was carried out on a series of 44 patients in the Carmichael Hospital for Tropical Diseases. Most of the patients came from different parts of Bengal where malaria is endemic. The studies were mainly undertaken to determine: (a) the effects of the drug on the temperature and other symptoms; (b) its effects on the asexual and sexual forms of the parasites,

and the time taken for their disappearance from the peripheral blood; (c) its effect on the splenic enlargement; (d) the effect of the drug on the pulse rate, blood pressure, respiration, and generally on the patients, and its excretion from the body; (e) any untoward effects produced by its administration. In this paper the results of these trials are summarized.

On admission of patients a thorough physical examination was carried out; the peripheral blood was examined and a rough estimate of the number of parasites, both sexual and asexual was made. Except in urgent cases, the patients were put on a simple alkaline mixture and the antimalarial treatment was not started until the parasite counts were observed for two or three consecutive days. This gave valuable information regarding the intensity of the infection. If the parasites in the peripheral blood were scanty, these were allowed to increase till the rigors and other symptoms were pronounced, and then the drug was administered. Crinodora (palusan) was given by the mouth in tablet form, one tablet, containing 0.1 gramme, being given three times a day for five consecutive days. No other drug was given except a mild purgative whenever necessary. No restrictions regarding diet were observed. Daily examinations of the blood were carried out for malaria parasites during the course of treatment and a rough estimate of the number of parasites was also made wherever possible. The pulse, blood pressure and respiration were carefully recorded.

After completion of the course the patients were kept in hospital for a fortnight, daily examinations of the blood for parasites being made during this period. Cultural examinations of the blood for malarial parasites were also made where thin and thick films were negative.

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TABLE

Race, Sex and Age		Species	FINDII PARAS BEF TREAT PER LEUCO	ORE MENT 500	Find				ing ani 500 le		TREATM ES	ENT.	Days of fever after beginning	Remarks
			As.*	Sex.	2nd	day	3rd	day	4th	day	5th	day	treatment	
			10.	Dex.	As.	Sex.	As.	Sex.	As.	Sex.	As.	Sex.		
H., M., H., M., H., F.,	22 23 5	B T B T B T and	240 Sc. 350	Sc. 0 Sc. (BT)	200 Sc. 275	Sc. 0 Sc. (B T)	Sc. 0 Sc.	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	2 2 2	
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M., M.,	62	QT	(BT) Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	4	Parasites free next day.

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Race, Sex	Species	PARA BEI TREAT PER	INGS OF ASITES FORE TMENT 500 OCYTES	Fin	IDINGS (	of para Parasi	SITES DU TES PER	URING A	ND AFTI LEUCOC	ER TREAT	FMENT.	Days of fever after beginning	
and Age		As.*	Sex.	2nd	day	3rd	day	4th	day	5tl	n day	treatment	
		As.	Sex.	As.	Sex.	As.	Sex.	As.	Sex.	As.	Sex.		
Н., М., 32	мт	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	0	Sc.	0	Sc.	3	Crescents killed by
H., M., 25 H., M., 24 H., F., 22 AI., F., 60	B T B T M T M T	Sc. 410 525 425	Sc. 0 0	Sc. 225 325 212	0 Sc. 0	Sc. Sc. 110 110	0 0 0 Sc.	0 0 Sc. Sc.	0 0 0 Sc.	0 0 0	0 0 0 Sc.	1 2 3 3	plasmochin.  Crescents
H., M., 40	мт	325	0	Sc.	0	Sc.	0	0	0	.0	0	1	persisted. Pains slight in
M., M., 38	мт	625	Sc.	450	Sc.	175	Sc.	Sc.	Sc.	0	0	3	epigastrium. Crescent
H., M., 33 H., M., 17 H., M., 41 H., M., 49 M., M., 52 H., M., 15	B T M T B T M T B T	Sc. 495 Sc. 320 Sc.	Sc. 0 0 0 0 0 0	Sc. 329 Sc. 130 Sc. 320	Sc. Sc. Sc. 0	0 128 0 Sc. Sc.	0 Sc. 0 0	0 Sc. 0 0	0 Sc. 0 0	0 0 0 0 0	0 Sc. 0 0	1 3 0 1 1	persisted.  Do.
H., M., 15 AI., M., 34	ВТ	595 Sc.	0	320 Sc.	0	300 Sc.	0	124	0	Sc.	0	3	Parasite free following day.
M., M., 44 H., M., 47 M., M., 20 H., M., 45	MT MT BT MT	398 Sc. 275 317	0 0 Sc. 0	198 Sc. 150 300	0 0 0 Sc. 0	118 Sc. Sc. 150	0 0 0 0 Sc.	Sc. 0 0 Sc.	0 0 0 0 Sc.	0 0 0 0 0	0 0 0 0 Sc.	1 2 1	Crescents disappeared spontaneously
H., M., 30 I.Ch., M., 25 M., M., 20 H., M., 31 H., M., 50 I.Ch., M., 15 H., M., 33 I.Ch., M., 30 H., M., 1 M., M., 24	MT BT MT BT BT BT BT BT	Sc. 425 320 Sc. 310 650 Sc. 780 Sc. 340	0 100 Sc. 0 Sc. Sc. Sc. Sc. Sc.	0 250 180 Sc. 200 275 Sc. 310 Sc. 200	0 90 Sc. 0 Sc. Sc. Sc. Sc.	0 300 80 0 110 Sc. 0 Sc. Sc. 85	0 Sc. Sc. 0 Sc. 0 Sc. Sc. Sc.	0 Sc. Sc. 0 Sc. 0 0 Sc.	0 Sc. Sc. 0 Sc. 0 Sc. 0 Sc.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 Sc. 0 0 Sc. 0 0	Apyrexial	H. W. Colitis. Anæmia. Parasite free next day.
AI., M., 37	МТ	258	. 0	150	0	Sc.	0	Sc.	0	Sc.	0	4	1.8 g. given. Parasite free
H., M., 47 H., M., 19 M., M., 28 H., M., 30 AI., F., 46 M., M., 37 H., M., 32 AI., M., 45	B T B T M T M T B M T M T M T Q T	374 Sc. 278 Sc. 421 Sc. Sc. Sc. Sc.	Sc. 0 0 0 0 0 0 0 0 0 Sc.	205 Sc. 190 Sc. 318 Sc. 0 Sc.	0 0 0 0 0 0 0 0 0 0 Se.	Sc. Sc. Sc. 116 Sc. O Sc. Sc. Sc. Sc.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Sc. 0 Sc. 0 Sc. 0 Sc. 0 Sc. Sc. Sc.	0 0 0 0 0 0 0 0 0 Sc.	0 0 0 0 0 0 0 0 0 Sc.	0 0 0 0 0 0 0 0 0 0 0 Sc.	3 2 3 2 3 3 2 3 2 3 4	? Blackwater fever. 2.1 g. given. History of
													hæmaturia. Parasite free 6th day.

\* As. = Asexual forms.

Details of 44 cases are given in the table. A study of the table will show that the temperature in all the three cases are given in the table. A gramme of the drug has been administered and there is complete disappearance of the parasites

ture in all the three species of parasites usually. | gramme of the drug has been all the three species of parasites usually. |

from the peripheral blood after 0.9 gramme to 1.2 gramme, except in quartan infections, where the drug had to be given for two more days to make the blood parasite-free. The drug has no action on the gametocytes of *P. falciparum*.

Rigors are seldom observed after the third day of administration of 'crinodora'. In mild cases of benign tertian infections, if the treatment with 'crinodora' is started on the day of the rigor, the next rigor is sometimes manifested in the form of a chilly sensation only, and in cases infected with the quartan type it does not come at all.

The blood pressure, pulse rate and respiration were recorded. So far as the blood pressure is concerned, there was a slight lowering, varying from 8 to 12 millimetres of mercury in some patients. In others there was no change whatsoever. The pulse rate and respiration also showed no appreciable changes when the patients were under the effect of the drug. From these results one is justified in concluding that 'crinodora' has little if any depressing effect on the cardiovascular system in the majority of the patients.

Excretion.—In a series of patients we worked out the excretion of this compound. It is mostly excreted by the kidneys and appears in the urine on the second day after administration and can be detected up to 25 days or longer. Three patients under treatment with 'crinodora' developed a slight yellow colour in the skin which passed away after a few days.

Splenic enlargement.—There was rapid reduction in the size of the spleen to practically its normal size in every case of acute infection, but in long-standing cases, where the spleen was hard, the decrease in size was more gradual and the organ often took a considerable time to come back to its normal size.

Untoward and toxic effects.—In spite of the fact that 'crinodora' persists in the body for a fairly long time no marked untoward symptoms were noticed. One or two cases complained of slight pain or a sensation of uneasiness in the epigastric region. A few of our patients have occasionally complained of loss of appetite while the drug was being given, but the condition passed off with the discontinuance of the medicine.

#### Summary and conclusions

- (1) 'Crinodora (palusan)' is an effective drug in the treatment of Indian strains of malaria. It is usually effective in doses of 0.1 gramme three times a day, the course lasting for five days and making a total of 1.5 gramme of the drug for the cure. The drug has no action on crescents.
- (2) The drug behaves in exactly the same way as atebrin and would make an excellent substitute for it now that the supplies from Germany have been cut off.

# IDIOPATHIC HYPOCHROMIC ANÆMIA WITH A CASE NOTE

By C. R. DAS GUPTA, M.B. (Cal.), D.T.M.
Calcutta School of Tropical Medicine

IDIOPATHIC hypochromic anæmia is a chronic form of anæmia found mostly in middle-aged women; it is associated with epithelial changes in the tongue and in the nails.

Atiology.—Over 96 per cent of cases occur in women (Wintrobe and Beebe, 1933) and the maximal incidence is between the ages of forty and fifty; the condition is rare below twenty and uncommon above fifty. Repeated pregnancy, as well as excessive loss through menstruation, are responsible for a large number of cases (Davidson et al., 1935).

From experimental evidence Heath, Strauss and Castle (1932) conclude that the main cause of the disease is iron deficiency. In a woman this may be due to a continual drain on the iron reserve of the body during the period of sexual life, deficient intake, and failure of proper absorption on account of hypochlorhydria or achlorhydria, iron being more readily absorbed from an acid medium (Mettier and Minot, 1931).

Although hypochlorhydria or achlorhydria is comparatively more common in women than in men (Davies and Shelley, 1934), they are not infrequently seen in men, whereas idiopathic hypochromic anæmia is rarely seen in men. It is therefore presumed that the low gastric acidity is not the main cause of the anæmia and that it is probably associated with some other, as yet unknown, deficiency of gastric secretion.

Symptomatology.—In addition to the physical signs and symptoms which accompany anemia, remarkable epithelial changes are common. Epithelial atrophy of the upper part of the alimentary tract is the most frequent finding, the tongue is denuded of papillæ and is often sore and there may be painful fissures at the

angles of the mouth.

Occasionally, there is atrophy of the pharylgeal mucosa, which when associated with dysphagia constitutes the Plummer-Vinson syn drome. Mucosal atrophy of the stomach is present in a number of cases and may be seen by means of the gastroscope; this is probably the basis of the hypochlorhydria or achlorhydria which is reported in a large number of cases (Witter 1921). The in a large number of cases (Witter 1921). (Witts, 1931; Davies, 1931; Mills, 1931; Oliver and Wilkinson, 1933). Gastro-intestinal symp toms, such as abdominal pain, anorexia, eructations, a sensation of fullness even after small meals, nausea, and vomiting, are usually present and are probably decimals and are probably due to lack of an adequate amount of bydrochlering amount of hydrochloric acid and an excess of mucus which makes the gastric juice very viscid (Davies, loc. cit.).

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In addition to these changes in the gastro intestinal tract, alterations in the nails

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common. They become more brittle with a tendency to split longitudinally, tender, flat and sometimes actually spoon-shaped, *i.e.*, koilony-

The hair is dry and scanty, and the patient is usually of a nervous and worrying temperament. Numbness and tingling in the limbs may be present, but definite organic nervous lesions are absent (Witts, 1930; Wintrobe and Beebe, 1933). Slight enlargement of the spleen is found in about 60 per cent of

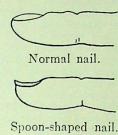


Fig. 1.

cases if the anamia is marked, but the enlargement is seldom of any considerable degree (Witts, 1930). Loss of blood through menstruation may be excessive but becomes normal after efficient treatment.

Hamatology.—The anamia is definitely hypochromic and microcytic. The red cell count lies between 3 to 4 millions per c. mm., whilst the average hamoglobin is below 6 grammes per 100 c.cm. The following figures given by Wintrobe and Beebe (1933) are on the average of 25 cases:—

Volume of packed red cells—29.5 c.cm. (limits 16.8 to 38 c.cm.).

Mean corpuscular volume—65 cu.  $\mu$  (limits 65–74 cu.  $\mu$ ).

Mean corpuscular hæmoglobin—18  $\gamma\gamma$  (limits 15-21  $\gamma\gamma$ ).

Mean corp. hæmoglobin concentration—27

per cent (limits 25-30 per cent).

Anisocytosis and poikilocytosis may be present, but are not marked. Normoblasts may be found in cases of severe anæmia, and the reticulocytes are within normal limits. The mean red cell diameter is from 6.2 to 6-7  $\mu$ , and the Price-Jones curve has a broad base with the peak on the left and the range of microcytosis is from 6 to 37 per cent (Price-Jones, 1932).

The total and differential leucocytic count is generally within the normal limits, but Witts (1930) describes a group of cases in which leucopenia was observed. The platelets, the coagulation time, the bleeding time, and the fragility of red cells are all within normal limits. The direct van den Bergh test is negative and the indirect test is also well within the normal range. There is no excess of urobilin in the urine.

Gastric analysis.—Hypochlorhydria or achlorhydria was found to be present in over 80 per cent of cases by Witts (1931) and Davies (1931) and by Oliver and Wilkinson (1933) in over whereas Vaughan (1936) found achlorhydria in only 14 per cent of cases. Though Davies (1931) according to him achlorhydria in alarge number of cases, hypochromic anæmia is only 'apparent' or relative' and is not absolute as in pernicious The above view is supported by

Meulengracht (1932) who holds that 'the achylia is not of the same radical character as in pernicious anamia and in a few cases it may be designated more correctly as hypochylia'.

Sternal puncture.—The bone marrow obtained by sternal biopsy shows hyperplasia of the red cell elements with a very large number, generally over 40 per cent, of normoblasts in the different counts.

Differential diagnosis

Pernicious anemia.—The characteristic clinical picture, the macrocytic hyperchromic blood picture with a megaloblastic reaction of the marrow, and achylia of the gastric juice, all serve to distinguish it very clearly from idiopathic hypochromic anemia.

Splenic anæmia.—This is seen in young adults, the spleen is greatly enlarged, there is persistent leucopenia which is due to neutropenia

and hæmatemesis is common.

Aplastic anæmia.—All the formed elements of the blood including the white blood cells and the platelets are diminished, the volumetric determinations are normal, and the anæmia is normocytic, orthochromic, while the sternal biopsy shows an aplastic marrow.

Malignant disease.—Chronic loss of blood from the gastro-intestinal tract should be excluded by careful examination of the stools for occult blood. In these cases the anæmia responds to a certain extent to iron treatment, but only to reappear when the iron therapy is withdrawn.

#### Treatment

The only efficient treatment lies in giving iron in large doses over long periods. The oral route is a far better method of administration than parenteral injection, although 1,000 milligrammes of iron and ammonium citrate by mouth is said to be equivalent to 32 milligrammes of iron given by intra-muscular injection (Heath, Strauss, and Castle, 1932) and although there may be digestive disturbances, and failure of adequate absorption in the absence of any free hydrochloric acid in the stomach. Administration of iron by parenteral injection is painful and an adequate dose can never be given without unpleasant toxic symptoms (Witts, 1931). But with the large doses which are now given by mouth adequate absorption is ensured and ample margin for waste is allowed. Constipation, which was at one time thought to be inevitable, is actually rare, and on the contrary diarrhea may occur for the first few days.

By the oral route, inorganic iron preparations are superior to the organic; for relative potency the more commonly used preparations are placed in the following order (Witts, 1933):—

Ferrous salts; scale preparations; ferric salts;

organic compounds.

The minimum effective dose is ferrous sulphate 12 grains a day, Blaud's pill 45 grains a day, or iron and ammonium citrate 60 to 120 grains

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a day. Ferrous salts should always be given in powder or tablet form, for when kept in liquid form they soon oxidize to ferric salts. The iron by mouth should be given for 3 to 4 weeks, and if necessary a second or third course with a short interval in between the courses may be given without any bad effect. In most cases, the result of treatment is dramatic and with adequate dose there is a gain of 0.3 gramme of hæmoglobin a day.

Hydrochloric acid in doses of half to one drachm should be given with the iron, in cases of hypochlorhydria or achlorhydria. It is a good appetizer, relieves dyspepsia, and promotes

absorption of iron.

Copper.—The opinion on the value of copper is conflicting, but for all practical purposes all iron preparations contain quite enough copper as an impurity, and there is no need to give it

separately.

Liver.—Whole liver contains a certain amount of iron and it is on account of this that generally there is a sense of well-being and some improvement after liver treatment, but the improvement is never sustained. And on the whole, liver extracts, stomach preparations, and proprietary preparations said to contain hæmoglobin, besides being expensive, are useless in the treatment of idiopathic hypochromic anæmia.

Blood transfusion.—This should be used only in very extreme cases to tide over the critical condition whilst the iron has time to take effect.

## Complications

Any septic foci that may exist should be attended to as soon as the patient is somewhat improved, for they reduce the efficiency of iron therapy and a permanent cure may never be effected in the presence of a septic focus.

## Pathology

Pathological evidence is rather scanty as patients rarely die of the disease. pathological changes found in the various organs are those of chronic anæmia and depend on the severity of the anæmia. The bonemarrow is hyperplastic and is crowded with macro-normoblasts and normoblasts which may constitute over 50 per cent of the total cells. It indicates that there is some maturation defect at the normoblastic level, the formation of the red cells proceeds up to the normoblastic level, but these, in the absence of adequate amount of iron, fail to mature properly, consequently the marrow is over-crowded with normoblasts and the cells that enter the circulation are smaller in size and do not contain the full amount of hæmoglobin.

The mucosa of the tongue and of the pharynx is usually atropied and may be ulcerated; sometimes atrophy of the mucosa of the stomach also may be seen.

#### Case note

Mrs. Z., a European, aged 45, was admitted into the Carmichael Hospital for Tropical Diseases on 8th May.

1939, for anamia. The patient had been treated in this hospital about one year ago for gastro-intesting trouble. Examination at that time did not show of viscerontes. anything excepting a certain amount of visceroptosis (revealed by a barium meal) for which she was advised months of the control of the last three months of the control of the last three months of an abdominal belt. For the last three months she had an abdominal belt. For the lad been a gradual increase in not been well. There had been a gradual increase in weakness—she was easily tired, and had palpitations on the suffered from headache most because of the suffered from headache most weakness—sne was easily offer, and had parplations on slight exertion. She suffered from headache, mostly in the afternoons and had no inclination for food or the afternoons and flatulent deeper had been paused and flatulent deeper had been paused and flatulent deeper had been paused from the parameter of the paused from the parameter of the paused from drink, and suffered from nausea and flatulent dyspepsia even after small meals, for which reason she was very reluctant to take any nourishment.

Examination of the patient.—The patient was fairly well nourished, with a sallow complexion, mousecoloured hair turning grey, and an increase in pigmenta-

tion on the face.

There was slight puffiness of the face, but no edema of the feet. The tongue was small, denuded of papilla, and slightly sore. The finger nails were tender and showed striking changes—they were brittle, flat, spoon-shaped with a tendency to split longitudinally, i.e., koilonychia. The teeth were bad, four of them being

Abdomen.-There was slight distension, the spleen and liver were not enlarged, there was no tenderness.

and no mass could be felt on palpation.

Circulatory system.—No enlargement of the heart was noticed on percussion, but a hæmic bruit was heard over the mitral area. The respiratory system did not show any abnormality

Nervous system.—The reflexes were normal, and except for the nervous and worrying temperament there

was no other neurological symptom.

Genito-urinary system.—Menstruation was regular but scanty; urine was normal.

Coagulation time—2 min. 45 secs. (capillary-tube method). Starting hæmolysis at 0.4 per cent of salt. Fragility of red cells—Complete hæmolysis at 0.3 per

cent of salt.

Wassermann reaction—Negative. (see 6.65 Price-Jones curve—Mean diameter, figure 2).

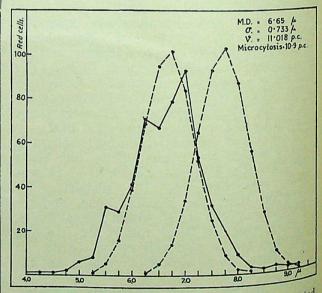


Fig. 2.—Red cell distribution curve of case reported with maximum and minimum ideal curves.

Sternal puncture.—This showed a hyperplastic marrow with more than 43 per cent normoblasts in the differential count of the nucleated cells.

Fractional gastric could be supported as the support of the nucleated cells.

hydrochloric acid Fractional gastric analysis.—Free hydrochloric was present within the normal limits and the fasting juice showed complete peptic digestion

Stool.—No protozoa nor ova were found.
The test for occult blood was negative.

Diagnosis.—The case was diagnosed as one of di pathic hypochromic anæmia.

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## Laboratory examination

Date	Hæmoglobin in grammes per 100 c.cm.	Red blood cells in million per c.mm.	Reticulocytes per cent	Cell volume per cent	Mean corpuscular volume in cu. μ	Mean corpuscular hæmo- globin in $\gamma\gamma$	Mean corpuscular hæmo- globin concentration per cent	White blood corpuscles per c.mm.	Neutrophils per c.mm.	Lymphocytes per c.mm.	Mononuclears per c.mm.	Eosinophils per c.mm.	van den Bergh mgm. per cent
8-5-39 26-5-39 2-6-39 13-6-39 29-6-39 24-8-39	6.32 9.92 11.68 13.37 14.02 14.57	3.69 4.33 4.36 4.14 4.85 4.76	1.0 6.3 3.0 0.1 0.4 0.2	24.0 35.0 37.0 40.0 42.5 46.0	65.0 80.7 84.6 96.6 87.2 96.6	17.1 22.9 26.7 32.2 28.8 30.6	26.3 28.3 31.6 33.3 33.0 31.6	6,450 6,250 7,300 8,650	4,800	1,024	384	192	neg. 0.4 0.2 neg. neg.

#### Treatment

The patient was at first put on ferrous sulphate gr. 6 three times a day—the routine method of iron therapy in our hospital. This increased her nausea and dyspepsia. So after three days, plastule (plain)\* was substituted for ferrous sulphate and these were given three times a day for a period of 42 days from 16th May to 26th June.

Seven teeth were extracted in stages, and the remaining teeth were scraped and cleaned.

Progress.—The patient showed definite signs of improvement from the first week of treatment. She gained about 2 grammes of hæmoglobin per week for the first three weeks of treatment with plastules—the maximum rise that one could expect with any efficient iron therapy. At the end of the treatment the blood picture had almost reached the normal level and the gastro-intestinal symptoms disappeared, koilonychia was fast disappearing and the patient had gained six pounds in weight.

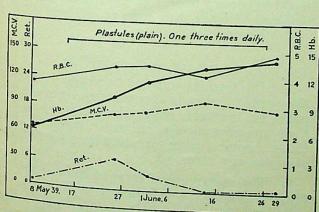


Figure 3.

During the next two months, during which time no treatment had been given, the patient continued in perfect health the fraction and perfect health the fraction and the perfect health the perfect health the fraction and the perfect health the perf perfect health, the finger nails were absolutely normal, and the blood picture was at the normal level.

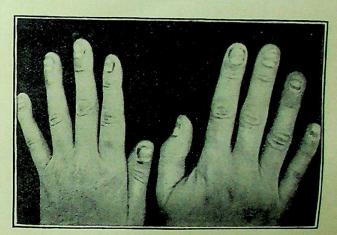


Fig. 4.—Nails showing koilonychia before treatment.



Fig. 5.-Nails almost normal after treatment.

#### Conclusion

A case of idiopathic hypochromic anæmia with typical koilonychia is reported; the condition responded to plastules (plain) in an orthodox manner.

Iron deficiency anæmia associated with koilonychia is a common finding in western countries. It has been reported by others in this country (Chaudhuri and Mangalik, 1938),

(Continued at foot of next page)

<sup>\*</sup> Plastule (plain) is an iron preparation manufactured by John Wyeth and Brother, Limited. Each plastule (plain) contains ferrous sulphate, 5 grs. and dried to us for trial by Mr. S. C. Chatterjee, a representative of the firm.

#### TYPHUS FEVER IN BOMBAY

By T. B. PATEL, M.B., B.S., B.Sc., B.Hy. (Bom.), D.P.H. (Eng.)

(The City Fever Hospital Laboratory, Arthur Road, Bombay)

THE number of admissions to this hospital of suspected cases of enteric fever have very considerably increased since 1937.

#### TABLE I

THE E	ANNUAL R XECUTIVE H FICER, BOME	FROM THE ANNUAL REPORTS OF THE MEDICAL SUPERINTENDENT, CITY FEVER HOSPITALS, BOMBAY			
	Register	ed cases	Admissio	ns for	
Year	Enteric	Typhus	Enteric	Typhus	
1932 1933 1934 1935 1936 1937 1938	308 349 341 326 387 556 1,168	1 1 0 0 0 0 1	3 8 32 3 8 106 235	0 0 0 0 0 0	

(Continued from previous page)

but this is the first time that we have found a case with typical koilonychia though we have seen a large number of cases of iron deficiency anæmia.

Acknowledgments

My thanks are due to Dr. L. E. Napier, under whose charge the patient was in hospital, for permission to report this case.

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From the beginning of June (1939) facilities for undertaking systematic laboratory investigation tion on cases of enteric fever became available and in consequence I have submitted every case of suspected enteric for close investigation. In cases where blood cultures and Widal tests proved negative, repeated tests were carried out on these cases for the typhus group and for un. dulant fever. In order that my findings may be controlled by a standard laboratory, I have uniformly employed, for diagnosis of enteric infections, typhus group of fevers and undulant fever by agglutination tests, standard antigens which have been supplied by the Enteric Laboratory, Kasauli.

The history and some of the clinical features of the seven cases hitherto diagnosed, with laboratory findings, are detailed below.

No case in this series showed a rash. All the patients were from the working classes.

Blood sera of cases 1, 4 and 5 were sent to Kasauli and blood sera of cases 4 and 5 were sent to the Haffkine Institute at the request of the Executive Health Officer, Bombay. These laboratories confirmed the diagnosis of typhus fever and obtained very much higher titres than mine. Although case 3 gave a low agglutination of 1:40 for OX19, it was undoubtedly a mild case of typhus from its clinical signs and symptoms.

#### Treatment

In addition to the usual lines of treatment, cases 2, 5 and 6 were also given sulpha-pyridine compound (M. & B. 693) in doses of 2½ grammes per day for 5 to 7 days, as these cases were found to be very toxic. In these three the results obtained with the drug were promising. All the patients recovered.

## Summary and conclusions

- 1. The features common to all these cases are the predominance of pneumonic signs, seven pains all over the body, absence of rash, and their incidence mostly within the city municipal limits. Some degree of anæmia with prostration was also observed.
- The occurrence of cases of endemic typhus fever in Bombay is definitely established.
- 3. The disease would have been more often diagnosed if all cases of continuous fever were serologically tax and a serolo serologically tested by the Weil-Felix reaction along with the Widal test.
- Sulpha-pyridine (M. & B. 693) has been left this found to be of value in the treatment of the disease.

I take this opportunity to thank the officer arge of the Transluli charge of the Enteric Laboratory, Kasall for his ready and prompt supply of standard anticons standard antigens and for his help in confirming some of my results, to Dr. B. P. B. Naidle his co-operation in this standard antigens and for his help in confirming the confirming the standard antigens and for his help in the field of the his co-operation in this study, and to the infedience TABLE II

Number	Admitted on	Duration of illness	Sex	Age	Caste	Locality	Clinical features
1	3-6-39	12 days	M.	38	M.	Dadar	Marked toxemia; cough; glossitis; temperature to normal by lysis on 10th day
2	16-6-39	16 "	M.	40	H.	Parel	of admission.  Headache; cough; intense toxæmia; bloodshot eyes; pneumonia: temperature to
3	5-7-39	8 "	M.	30	Ch.	Andheri	normal by lysis on 11th day of admission. Slight toxemia; tongue heavily coated; spleen palpable; temperature to normal
4	25-7-39	11 "	M.	22	H.	Tardeo	by lysis on 8th day of admission.  Tongue raw at the tip and coated elsewhere; pneumonia; spleen palpable; anæmia; temperature to normal by lysis
5	30-7-39	8 "	М.	30	М.	Nulbazar	on 8th day of admission.  Broncho-pneumonia; very toxic; developed later marked anæmia: temperature to
6	6-9-39	4 "	М.	20	H.	Walkeshwar	marked; abdominal distension; tempera-
7	25-11-39	4 "	М.	30	M.	Nagpada	ture to normal on 6th day of admission. Severe joint pains; moderate toxæmia; slow pulse; bronchitis; temperature to normal by lysis on 7th day of admission.

TABLE III

Results of the Weil-Felix reaction—agglutination tests were put up to a titre of 1:320 only

Case	Date	Widal	WE	IL-FELIX	TEST	
		test	OX19	OX2	OXK	B. abortu
1 2 3 4	20-6 23-6 23-6 28-6 3-7 7-7 10-7 6-7 9-7 27-7 4-8 7-8 12-8 2-8 6-8		1:320 1:320 1:80 1:80 1:80 1:80 1:40 1:40 1:40 1:40 1:320 1:320	1:320		
6	11-8 12-9 14-9		1:320 1:80 1:160	1:20	Ξ	
*7	18-9 30-11 4-12	1111	1:320 1:160 1:320 1:320	1:40 1:320		

<sup>\*</sup>This case is still under treatment in the hospital.

Superintendent, Dr. P. T. Patel, of City Fever Hospitals, for his permission to publish these notes.

[Note.—The evidence that case 3 was typhus appears to be very slender: an agglutination (with OX19) of 1:40 is surely not significant especially in view of its in the clinical notes.

The treatment with M. & B. 693 the writer describes as 'promising', but the evidence that the three patients treated with this drug did any better than the rest seems to be lacking.—Editor, I. M. G.]

#### MINIATURE MASS RADIOGRAPHY\*

(A PLEA FOR ITS ADOPTION)

By SUDHIR C. ROY, M.B.

Honorary Visiting Physician (Chest Department), District Hospital, and Honorary Medical Officer, Tuberculosis Association, Bakarganj, Barisal

The method was first discussed in England and America within a short time of Ræntgen's discovery of the x-rays, but the credit of introducing it in practice goes to Collender, who worked at it in South Africa for the first time in 1927 (Dormer and Collender, 1939). Independently of him, research along similar lines was undertaken in South America, Japan and Germany. To Janker (Lancet, 1939) belongs the credit of popularizing it in the last-named country, and as a result of the routine adoption in the Berlin Police Force, the morbidity from tuberculous disease of the lungs in the force has been brought down to almost the vanishing point.

The principle consists in photographing the image produced by the x-rays on the fluorescent screen. The essential requirements are a camera with a large aperture, a fluorescent screen and a film of fine grain. The exposure to the rays must be of short duration (not exceeding 1/20th second) with low penetration. In Germany an ordinary camera with roll-films was used with satisfactory results.

The position of the camera with regard to the fluorescent screen having been determined, it is fitted to the narrow end of a lead-lined funnel, whose broad end is fixed to the fluorescent screen. The funnel serves to exclude external light. The distance between the camera and

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<sup>\*</sup>Read at a clinical meeting of the Barisal Branch of the Indian Medical Association.

the screen is approximately four feet, and had to be determined by the pioneers by a method of trial and error. The height of the combination should be adjusted according to the height of the patient. The x-ray tube is placed at a fixed distance at the screen-end of the funnel, and should also be adjustable.

The patient stands with his chest against the screen, and the exposure is taken after adjusting the tube to the centre of the screen. A reduced photograph of the image on the screen is taken by the camera, which is re-charged for the next patient, with a special device. The film in the camera can be made to turn-on automatically with the action of the exposure-switch.

The films are developed in the ordinary way, and are later read under a magnifier or in a projector, or the prints may be enlarged on bromide paper to any required size.

In a plant for extensive miniature radiography, the parts must be made for 'heavy duty', should have 'adequate' protecting arrangements and a rapid cooling device for the tube. With such a plant, an operator can 'at reasonable estimate' examine 100 patients in an hour. It has been calculated that the cost amounts to only a penny

Collender used a single tube, which he cooled by immersing in circulating oil. Janker (loc. cit.) simplified the process by using two tubes mounted on a single pillar. When one of the tubes became heated it was replaced by the other. Recently Dormer and Gibson (1939) have used a double set of appliances and operators, and have immensely facilitated the work. Using two Rotalix tubes with a single generator and a rapid change-over arrangement, they have eliminated the loss of time taken in preparing a patient for exposure. Two operators working five hours a day have been able to take 600 exposures with this arrangement.

The optimal size of the radiogram is 24 mm. square, and the details are clearly exhibited for diagnostic purposes. In bromide enlargement of the reprints, the details are to some extent lost but are still comparable. Compared with the results of routine screen-examination, it has been found to be more reliable. Moreover, a permanent record of the condition remains.

Now that enquiry into the problem of pul-monary tuberculosis (especially mass surveys) has become popular in different parts of the country, and that the unique importance of chest radiography in the condition has been well recognized, the introduction of miniature mass radiography as a routine measure is all the more desirable, especially in a country such as India where economic considerations rank first. Moreover, the rapidity with which such radiographic examinations are possible is an additional advantage in examining large groups of students, factory and office workers and recruits for the militia. Its use may also be extended to serial

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RÔLE X-RAY SCREENING OF DETECTING PULMONARY TUBER-CULOSIS\*

> By K. EISENSTAEDT, M.D., T.D.D. and A. U. RINDANI, M.B., B.S. Vibhavillas Palace, Jamnagar

REGARDING the various branches of the antituberculosis campaigns carried on in recent times such as treatment, prevention, after-care, etc. we have to bear in mind that the diagnosis is of primary importance. It goes without saying that best results depend on early detection. For

\* Read before the meeting of the Nawanagar Medical Society, on 13th December, 1939, at Jamnagar.

(Continued from previous column)

recording in artificial pneumothorax and other

forms of collapse therapy.

In the western countries, Germany, America and England, the importance of miniature radiography has been enhanced as a result of its possibilities in examining recruits for the army. In times of war-emergency this rapid method of medical examination of the recruits has the double advantage of combining cheapness with rapidity, and miniature radiography, though not ideal, gives results sufficient for inclusion as a routine method for every case. Moreover, the chances of affected individuals escaping detection and passing into the ranks are negligible. In fact, the recent death of a militiaman from pulmonary tuberculosis within a few weeks of being classed as grade 1 by a medical board, has focussed attention on the importance of radiological examination of recruits. Miniature radiography has been suggested as the means of obviating such incidents in future.

At present in the tuberculosis survey, undertaken by the Bengal Public Health Department, at Barisal, a sum of Rs. 6,000 has been allotted for the radiological examination of 2,000 people of the town. A similar sum has been allotted for such a survey at Serampore. Within three months of commencement the Barisal centre has been able to examine only 48 cases, and in the whole period of work, which is at present fixed at one year, only 200 cases could be examined at this rate. at this rate. It is obvious that miniature radio graphy would have proved more advantageous at less cost, and would have given a truer picture of the condition of the condition of tuberculous infection prevailing in the locality ing in the locality. It is with the hope that this matter will receive matter will receive due consideration in future

that the present paper is concluded.

Dormer, B. A., and Collender, K. G. (1939). Lancel, p. 1309. i, p. 1309.

Dormer, B. A., and Gibson, M. (1939). Ibid.,

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this purpose it becomes more evident that in mass examination, clinical methods, sputum analysis, and tuberculin test cannot compete with x-ray screening in rapidity and reliability.

Recently, the experience has proved in Europe that a great many unsuspected cases have been detected by serial x-ray screening regularly conducted in military forces, police, and educa-

tional institutions.

According to a Swiss report, the average result of such mass screenings of apparently healthy young persons is the discovery of 0.5 to 1 per cent active lung tuberculosis not recognized at all, even by the affected persons themselves.

Another, a German, report gives even more

detailed results :-

	THE PERSON NAMED IN COLUMN		
Out of 1,000 apparently healthy persons	Cases in need of treatment	Number with positive sputum	
In the environment of TBpositive cases.	100 to 150	25 to 50	
In the environment of children.	1 to 2	0 to 1	
In the environment of juvenile persons.	10 to 20	3 to 5	
In the environment of adults.	2 to 8 to 15	1 to 4 to 8	

A report from Denmark gives the following findings:—out of 1,180 students, 12 were suffering from pulmonary tuberculosis of which 7 had positive sputum.

An American report shows that mass screening gives a discovery rate of 2.9 per cent. The following table gives the more detailed account :-

'silent cavities' is a fact well known to all specialists.

We have to admit the fact definitely that the time has gone when the doctor can rely on clinical examination only in diagnosing lung affections. Even in cases with evident dullness and catarrhal signs, the general practitioner cannot give a better diagnosis than a probable one. There are no reliable distinguishing clinical signs between tuberculous and other lung affections, e.g., bronchiectasis, bronchitis, asthma, carcinoma, pneumoconiosis, etc.

Again, examination of sputum is impracticable in mass detecting work, as it is complicated and takes up too much time and fails even in so-

called 'virtually open' cases.

A merely probable diagnosis of lung tuberculosis is of little help in deciding to take preventive or curative measures.

The extent of the lesions, on the one hand, and the allergic-clinical character on the other hand, may produce so great a variety of appearances that their diagnosis depends largely on ræntgenological examination, and further every step in therapeutic measures depends on the x-ray diagnosis, because various appearances require various measures.

How far a private practitioner can do his share in detecting work depends on local conditions. Whatever these conditions may be, there is no doubt that the co-operation of physicians is of extraordinary importance within the framework of anti-tuberculosis campaigns. This fact was stressed recently by Plunkett (1939). He says: 'More cases of tuberculosis are discovered by the examination of patients referred by family physicians for diagnosis than by any other generally practised method of case-finding.

TABLE

	The second second	LL		NEW PATIENTS						Re-e	XAMINI	D PATI	ENTS	
Out of 11,928 patients.	Total		То	Total C		tact Non-			Total		Contact		Non- contact	
	No.	Rate %	No.	%	No.	%	No.	%	No:	%	No.	%	No.	%
(D)	. 349	2.9	319	3.2	127	3.4	192	3.6	30	1.1	20	1.0	10	1.1

The latest experience in tuberculosis clinics in Europe has proved that clinical examination alone, especially in early and even sometimes in more-or-less advanced cases, is not reliable without x-ray examination.

Percussion and auscultation are of no avail in cases of early infiltration, diffuse small nodular infiltration, miliary tuberculosis, etc. In many cases of cases of reentgenologically-visible cavities also, the classical clinical symptoms fail us. Even in patients with clinical symptoms fail us. patients with big cavities, auscultation signs may be absent and the negative findings of so-called

It is important that no stone should be left unturned to secure the co-operation of the practising physicians in obtaining the examination of all adults, who present symptoms which might even remotely be referred to the chest'

Detection work can be carried out on the same lines as in some countries in Europe by mass screening of select groups of the population, e.g., hospital admissions, military, police, educational institutions, state employees, and even private concerns such as mills, mines, banks, etc. It rests with the medical department to set an

example by screening once all cases admitted into the State hospitals. According to the experience of Plunkett (loc. cit.) this selected group reveals the greatest number of cases, viz, 1.2 per cent. 'Of special significance is the study being made of admissions to 14 general hospitals throughout New York, which not only shows the highest yield, but also shows that a surprisingly large number of cases of tuberculosis are admitted to hospitals without being recognized. No children are included, nor any persons in whom there was a previously-known tuberculosis lesion. Of the 47 new active cases already discovered, 19 had evidence in the hospital charts which might have led the attending physician to diagnose the case before discharge. However, 28 or 0.7 per cent of adult admissions were found to have active tuberculosis, although there was no evidence in the hospital records, which indicated that tuberculosis was suspected at the time of admission. If the same conditions prevailed throughout the United States, about 45,000 unrecognized cases of tuberculosis were admitted in general hospitals during 1937'

A case with distinct clinical signs is revealed on x-ray examination generally to be in a fairly advanced condition. Unfortunately, the patient does not become aware of his disease till then, and so it is too late for any medical treatment that can stop the progress of the disease. Very few people ask for medical advice for the minor troubles which appear in the early stages of the affection; and most of the general practitioners also look upon these as minor troubles and neglect the x-ray control. It is incumbent on every medical practitioner to direct such patients to the proper centre for x-ray examination. following points will be a guide to him under which circumstances a patient ought to be sus-

pected of lung tuberculosis.

X-ray examination should be undertaken for, (1) everybody who applies for examination because suspected of or exposed to lung tuber-

culosis, (2) everybody who is under medical treatment for more than 3 months on account of any

disease of the respiratory tract,

(3) everybody who has chronic or periodic

feverish conditions,

(4) everybody who has sought for, during the last years, repeated medical advice for 'colds', bronchitis or similar diseases,

(5) everybody who is suffering from an 'atypical' influenza, pneumonia or other diseases

of the respiratory tract,

(6) everybody who is suffering from a dry pleurisy or pleurisy with effusion (these patients should be observed for several years and be examined by x-rays at regular intervals),

(7) everybody who spits blood,

(8) everybody who is suffering from any extrapulmonary tuberculosis, erythema nodosum, anal fistula or abscess, cervical adenitis, diabetes or any other obstinate and obscure disease of the

(Continued at foot of next column)

#### THE DESTRUCTION OF AIR-BORNE BACTERIA

By R. C. WATS, M.D. (Liv.), D.P.H., D.T.M. LIEUTENANT-COLONEL, I.M.S.

and

G. K. KAMAT, B.Sc.

Haffkine Institute, Parel, Bombay

In a bacteriological laboratory in the media and vaccine rooms, or in rooms where tissue culture work is being carried out, the sterilization of the air is of decided advantage. The fungus infections during the monsoon in India are so common that any method ensuring even a partial success would be welcome. The old method of washing the floors and walls with an antiseptic solution has practically no value in sterilizing the air. Fumigation with formalin or other vapours has a feeble and limited action and may destroy any bacterial cultures stored in the laboratory. Pulvertaft and others (1939) have carried out an extensive series of tests by atomization of bactericidal solutions with a phantomyst'—an electrically operated apparatus capable of introducing the liquid antiseptic into the atmosphere in the form of a dry and penetrating mist. This mist does not condense on walls or other objects and remains suspended in the air for hours. The antiseptic in this form is in colloidal state and is generally called 'aerosol'. For its mode of action and other details the original paper of Pulvertaft and others is invaluable. Our main object in undertaking this work was to test the efficiency of the aerosols as generated by the phantomyst with a view to eliminating contamination in the vaccine-making departments at the Haffkine Institute. For preliminary work, phantomyst model A1, which is recommended by the manufacturers for rooms of 1,000 cubic feet capacity, was used but, as it was too small for the vaccine-sowing room, another spraying mechanism was substituted and found successful.

(Continued from previous column) digestive tract, chronic otitis media of uncertain

(9) everybody who wants a certificate of health and has symptoms which may be caused

by tuberculosis.

Looking at the above statistics in western countries, it is our emphatic suggestion that every centre of the anti-tuberculosis campaign should be equipped with an x-ray plant fit for serial screening and with an x-ray plant fit and by an serial screening and should be conducted by an experienced area in should be conducted by an experienced area in the state of the state experienced specialist who, by the support public and private public and private co-operation, would be able to carry out detection to carry out detection work to the utmost advantage.

Plunkett, R. E. (1939). Amer. Rev. Tuberculos. Vol. XXXIX, p. 256.

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(a) The room.—One of the laboratory rooms (23.5 by 18.5 by 13 feet) with a cubic capacity of 5,650 cubic feet was utilized for the experiments. The room had four windows and two doors and beyond closing these in the ordinary way no special precautions were taken to make the room air-tight. The room had a ceiling fan which was kept working during all the experiments.

(b) Bactericidal solution.—As resorcinol has been recommended by Pulvertaft, the solution containing equal parts of glycerine and a saturated aqueous solution of resorcinol was used in most of the experiments. Chloramine T solution (aqueous 5 per cent) was also employed in some experiments.

(c) Bacterial cultures.—Cultures of Bact. prodigiosum, Staphylococcus albus, Streptococcus fæcalis (enterococcus) and Bact. coli were used as test organisms. Watery emulsions of the growth on standard agar were standardized by Brown's opacity tubes and sprayed in the room by means of De Vilbis hand-power spray outfit (type TZ-601) consisting of a hand pump, air tank and a spray gun. This apparatus is



Fig. 1.—The atomizer in action.

capable of developing an air pressure of about 15 pounds per square inch and, its nozzle being adjustable, a very fine spray can be produced. In most of our experiments Bact. prodigiosum has been used as the test organism.

(d) Phantomyst model A1.—The manufacturers, Messrs. Andre (Components) Ltd., recommend this equipment for dwelling rooms, hospital mend have pital wards, etc., both for insecticidal and bacpurposes. The disinfecting fluid emanates from the machine in the form of a cloud made up of very fine particles 'in the colloidal or aerosol state'.

(2) Atomizer with power-driven air-compressor outfit.—This is an assembly used for humidifying industrial plants the details of which are as follows:-

(a) Ingersoll-Rand electrically-driven aircompressor with steel air receiver.

(b) No. 4 Amco atomizer requiring 3 c.f.m. at 30 to 35 lbs. pressure.

The atomizer consists of a tubular spraying nozzle with separate inlets for compressed air and fluid (figure 1). The air inlet is controlled by an external regulator. The fluid inlet is controlled by a built-in device which prevents atomization until the pressure of the compressed air has reached 30 to 35 pounds, and stops atomization before the air pressure has dropped below 30 pounds. These features eliminate the dripping of the fluid both at the commencement and at the end of the spraying. A very fine atomization is achieved by this sprayer though the final product is not like a cloud as in the case of the phantomyst.

#### Details of experiments

1. Control suspensions of Bact. prodigiosum (200,000 million organisms) were uniformly sprayed by De Vilbis hand-power pump. Petri dishes containing nutrient agar were exposed for 10 minutes at three different parts of the floor of the room 30 minutes after introduction of the organisms.

A similar set of nutrient agar plates were exposed at the end of an hour. The exposed plates were incubated at 37°C. for 48 hours and colonies counted. The results are recorded in the table and are apparent from the photographs (figures 2 and 3) more than 1,000 colonies being present on each plate at the end of an hour.

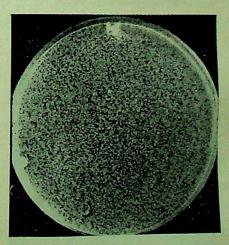


Fig. 2.—Control—Petri dish containing nutrient agar exposed for 10 minutes, 30 minutes after introduction of the organisms into the air of the room.

A similar experiment carried out without working the ceiling fan showed innumerable colonies on immediate exposure of the agar plates and about 10 colonies when exposed at the end of 15 minutes. This clearly shows that the introduced organisms had settled by gravity

in a very short time. The importance of keeping the ceiling fan working fully is apparent.

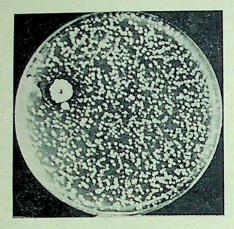


Fig. 3.—Control—Petri dish containing nutrient agar exposed for 10 minutes, 60 minutes after introduction of the organisms into the air of the room.

#### Test experiments

1. Phantomyst.—A similar procedure was adopted for the test experiments, except that the phantomyst machine containing resorcinol solution was started immediately after dispersion of the organisms. To test the effect of the various quantities of the disinfectant the machine was run for 15, 30 and 60 minutes respectively in separate series of experiments. At the end of quarter, half, and one hour 5, 8 and 12 cubic centimetres of the solution were blown out on an average. The colonies after running the machine for a quarter of an hour (5 cubic centimetres) were numerous, while two to three colonies were always found after half and one hour running (figure 4). From these experiments, it was evident that a minimum quantity

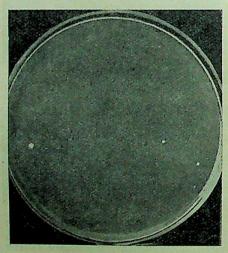


Fig. 4.—Petri dish containing nutrient agar exposed for 10 minutes, 30 minutes after disinfection by the Phantomyst (8 c.cms. of resorcinol used).

or 8 cubic centimetres of the resorcinol solution was essential to sterilize the atmosphere of the room (about 5,500 cubic feet). This almost

agrees with the result obtained by Pulvertaft in his experiments.

2. Atomizer with power-driven air-compressor outfit.—As mentioned previously, we had not a bigger model of the phantomyst and as the room to be sterilized was about 10,000 cubic feet we were obliged to experiment with apparatus used for humidifying the atmosphere in the cotton mills of Bombay in order to see if this would serve our purpose.

The aqueous suspensions of Bact. prodigiosum were dispersed in the atmosphere as in the control experiment. The resorcin solution was nebulized by means of the special atomizer (vide supra). Various amounts of the disinfectant were used to find the minimum quantity and time necessary for complete sterilization. The main difference with this type of machine is that the operator has to direct the spray into all parts of the test chamber and in larger rooms would have to walk about to get equal distribution of the liquid.

The other procedures were similar to the experiments described above. It was found that 12 cubic centimetres of the resorcinol solution would give similar results to the phantomyst experiment, i.e., an average of 2 or 3 colonies per plate after a quarter of an hour, as well as half an hour, instead of the innumerable colonies in the control experiment. To eliminate totally the development of any colonies whatsoever, larger quantities of the resorcinol solution were tried. It was found that 25 cubic centimetres of the disinfectant were necessary for the purpose (figure 5). Having established these facts, we substituted other organisms for Bact. prodiciosum.

The results are tabulated in table I.

A few of these experiments were repeated with 50 per cent chloramine-T solution using Bact. prodigiosum suspensions for test and were found to give similar results both in the case of the phantomyst as well as the atomizer.

Effect on culture media.—Pulvertaft et al. (1939) have stated that the plates exposed to the aerosols at their exit from the phantomyst for periods of 10 minutes or longer and then exposed to bacteria in control rooms showed no inhibition of growth. This is a very important point in the vaccine-sowing rooms and a series of experiments were carried out specially with the atomizer.

Phantomyst.—In the case of the phantomyst superimposed 5 per cent rabbit-blood-agar slopes were directly held for about 10 minutes over the outlet so that the mist of resorcing solution could be seen travelling to the unplugged tubes. These tubes, as well as exposed ones, were incubated with an equal amount of the suspension of Past. pestis. The incubating at 37°C. and room temperature the number of colonies were counted and found to be about the same (± 10 per cent error).

Atomizer.—A slightly different experiment was repeated in the case of the atomizer, the

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TABLE I
Atomizer experiments

	Con	TROL	TREAT	TED AIR	Amount of resorcinol	
Type of organisms	Interval in mins.	Colonies	Interval in mins.	Colonies	(in c.cm.) in suspen- sion in 5,500 cubic feet of air	
Bact. prodigiosum	30 60	Infinite 1,000	15 15	3 0	12 25	
Staphylococcus albus	30 60	Infinite Infinite	15 15	4 0	10 25	
Streptococcus facalis (enterococcus)	30 60	Infinite 1,000	15 15	4 0	12 25	
Bact. coli	30 60	Infinite 1,000	15 15	4 0	12 25	

tubes being fixed in a rack and placed on the floor. The resorcinol solution (25 cubic centimetres) was blown into the room and the tubes kept unplugged for 10 minutes. In a similar experiment the media did not show any inhibitory effect as compared to the control.

Practical application.—This method of sterilizing the air was introduced into the plague vaccine-sowing room and the antirabic department. Though this method has been in practice for about a month only, the results are very encouraging as is apparent from the following figures.

As after monsoon the contamination goes down normally, the figures for the period corresponding to the time of disinfection by atomization for the previous two years are quoted below:—

	Total num- ber of flasks sown	Contamina- tion, per cent
After the introduction of atomization—		
29th September to 19th November, 1939.	1,086	2.0
Previous to atomization—		
During 1937 (same period)	1,133	5.0
During 1938 (same period)	1,128	4.4

Summary and conclusion

1. As claimed by Pulvertaft et al. (1939) the resorcinol solution nebulized by the phantomyst rooms.

2. An alternative method by using a special atomizer worked by compressed air has been of the bactericidal fluid are used.

3. Since our experience with atomization is limited, we cannot say whether this method is

universally applicable but we can recommend it for laboratories. If compressed air is available the other outfit (excluding the power unit) costs about Rs. 100.

We wish to record our thanks to the Anglo-Siam Corporation and Messrs. Ingersoll-Rand (India) Ltd. of Bombay for the loan of the machines.

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A STUDY ON THE TOXICITY OF THE BILE ACIDS AND THEIR DERIVATIVES PREPARED FROM INDIAN OX BILE

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> > and

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PILLS or capsules containing the extract of ox bile are often prescribed for stimulating the action of the liver and for favouring the absorption of fat by the intestine. In this respect natural bile salts, being of more constant composition, are often preferred. But, while preparing such salt from the bile collected from the local slaughter-house, it was noticed that the Indian ox bile is invariably poor in its bile-salt content. Again, as the bile acids and their derivatives possess a strong depressant action on the heart and at the same time are markedly hæmolytic, any work on the preparation of such compounds, particularly from a bile of the above nature, warrants a study of the toxicity of the products that are to be prepared from it. Accordingly, the general characteristics of the Indian ox bile collected over a period of six months from March to August were first noticed, and then the pharmacological properties of the salts, as well as of certain products (sodium cholate and sodium dehydrocholate) derived

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from them, were studied. All these observations are embodied in this paper.

#### Experimental

Usually the gall bladders were secured from the local slaughter-house and kept in an ice-cold temperature till they were handled for extracting the bile present. The total bile was extracted from each of them and analysed for noting the characteristics as shown in table I. The biles were of a yellowish-green colour and alkaline in reaction. The pH from a direct-reading glass-electrode pH meter (Leeds and Northrup), the specific gravity by the bottle method, the refractive index by Abbe refractometer, the surface tension by the drop method, and the viscosity were noted in each sample at 35°C. The percentages of total solids as well as the ash on incineration were also determined. Table I gives the average maximum and minimum figures from an analysis of 600 samples.

alcohol. The alcoholic solution, on dilution with ether, afforded the bile salt in granular form. These sodium salts were further purified in the way described in the process of purification of sodium cholate, and subsequently dissolved in water to the required concentration.

Hamolysing property.—All experiments in which substances were tested for hamolytic action were carried out in the following manner. The red blood cells were obtained from the blood of a normal sheep. The plasma was removed by centrifuging and the cells then washed five times with 0.9 per cent sodium chloride solution. A 2 per cent suspension was made of the washed cells in normal saline. A tube containing I cubic centimetre of this suspension, mixed with 1 cubic centimetre of 0.9 per cent saline, served as a control and the various other tubes contained 1 cubic centimetre of the suspension, the amount of test solution, as shown in the table II, and the volume of water or saline required to make the

TABLE I
Characteristics of Indian ox bile

	pН	Density	Refractive index	Surface tension in per cent of water	Viscosity	Total solids	Ash, per cent
Maximum	7.35	1.0210	1.3456	61.80	1.487	8.0	1.0
Minimum	6.9	1.0140	1.3410	62.5	1.20	5.2	0.7
Average	7.15	1.0178	1.3438	62.46	1.362	6.7	0.9

The total amount of the bile collected in a day was refluxed with sodium hydroxide (8 gms. per 100 c.cm. of the bile) for several hours and the cholic acid formed was isolated by acidifying the resulting solution. The acid thus obtained on purification and crystallization from ethyl alcohol melted at 196° to 197°. The yield on the average was 15 to 18 gms. per litre of the bile. The crystallized cholic acid exhibited all the properties characteristic of the compound. The acid was dissolved in a small amount of alcohol and treated with a solution containing the molecular amount of sodium carbonate. The sodium salt of the cholic acid was then precipitated out by the addition of ether. It was redissolved in dilute alcohol and again precipitated out with ether. The purified sodium salt thus obtained, was dissolved in water to afford the solution required for the pharmacological investigations (vide infra). The cholic acid was oxidised by a chromic acid mixture in glacial acetic acid and the dehydrocholic acid found was collected, washed well with water, and crystallized from ethyl alcohol. It melted at 233° to 235°C., gave no Pettenkofer's reaction and was readily soluble in sodium carbonate to afford a pale yellow solution.

The natural bile salt was prepared by evaporating the raw bile with animal charcoal and subsequent extraction of the pasty mass with total volume 2 cubic centimetres in each case. After being shaken to ensure complete mixing, the tubes were allowed to stand at room temperature (31°C.). Hæmolysis determinations were made at intervals by centrifuging and by evaluating the intensity of red colour in the supernatant liquid and also the amount of red blood cells left behind in certain cases. The supernatant solution of the control tube was found to remain colourless even after 24 hours at the room temperature.

Tests for intravenous toxicity.—For studying the toxicity of the above three salts—the natural bile salt (2 per cent solution), sodium cholate (2 per cent) and 'dehydrocholin' (5 per cent) male white mice from our own stock and of average weight 20 to 21 grammes were taken and the solutions were injected intravenously. Table III shows the survival rate of the animals so treated.

so treated.

Sodium dehydrocholate has been described as practically non-toxic (cf., Neubauer, 1923) and at the same time exerts a definite choleretic (Wakefield et al., 1929) as well as a powerful (Wakefield et al., 1931). It was accordingly considered to be of interest to see whether it further exerts any influence on the toxicity of other bile acid salts. Recently, sodium dehydrocholate has been found to exert a favourable influence in increasing the tolerance

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to arsenic therapy (cf., Jacchia and Truffi, 1934; Robba, 1937). Each of a set of mice was injected intravenously with 8 mgm. of sodium dehydrocholate (dehydrocholin 5 per cent) and after eight days they were divided into two

#### Discussion

From table I it is evident that the average total solids in gall-bladder bile is 6.7 per cent and the density 1.0178; but the above two data as recorded in Smith's Manual of Veterinary

TABLE II The hamolytic effect of different bile salt solution

application of the s	Cubic centimetres	Test solution	Distilled	Normal	Final concentra-	Hæmolysis	
Substance	of sheep cell suspension (2 per cent)	in c.cm.	water in c.cm.	saline in c.cm.	tion of the salt, per cent	After 2 hours	After 24 hours
Sodium dehydrocho- late 2 per cent'sol,*	1 1	1.0 0.5 0.25	0.5 0.75		10.0 5.0 2.5	=	
Sodium cholate 4 per cent sol.	1 1 1 1	1.0 0.5 0.25 0.25	0.5 0.75	0.75	2.0 1.0 0.5 0.5	p p +	p +- +
Bile salt 4 per cent sol.	1 1 1 1	1.0 0.5 0.5 0.25	0.5	0.5 0.75	2.0 1.0 1.0 0.5	+ + + p	+ + + p

<sup>\*</sup>In all the experiments the sodium dehydrocholate solution used was the 'dehydrocholin' of Bengal Immunity Co., Ltd., Calcutta.

+ Complete hæmolysis.

p Partial
- No

groups. One group was injected with different doses of natural bile-salt solution (2 per cent) and the other with those of sodium cholate (2 per cent). A fresh batch of mice treated with the minimum lethal dose of the bile salt served

Physiology (1921) are 9.6 and 1.022 to 1.025, respectively. The alkalinity (pH = 7.15) of the Indian ox bile is also not so pronounced. The bile salt isolated from the bile, however, is extremely hæmolytic as usual and seems to exert

TABLE III Intravenous toxicity of different bile salts on mice: average weight 20 to 21 grammes

Substance			Dose in	Number of		Number of mice dying in a day				
			mgm.	mice	1	1 2 3 4		4	Survival	
Bile salt		•••	2 3 4	3 3 6	••				3 3	
Sodium cholate					6				3	
Dehydrocholin			2 3 4 5	3 3 4 6	6	i	i		3 3 2	
Jaroenonn		••	4 8 16	3 6 6					3 6 6	
			4 8 16 20 24 30	3 6 6 6 8	5	3			6 6	

as control in the former case, and another treated with the former case, and another treated with the minimum lethal dose of sodium choleto cholate served as control in the latter case. Table IV shows the result of this investiga-

a direct action on the red blood cells. Even a 0.5 per cent solution of the salt in 0.8 per cent saline was found to be hæmolytic, whereas the contents of a similar tube containing the cells suspended in 0.8 per cent saline showed no sign

of hæmolysis. On injecting the minimum lethal dose into mice symptoms of immediate depression and blackening of the skin were invariably noticed. That Indian ox bile is of poor quality was also evident from the amount of cholic acid isolated by hydrolysis of the bile.

to 50 per cent. The significance of this observato 50 per cent. The color clinical applications of the color of the co the natural bile salts, the tolerance of the medicament may be considerably increased by previous treatment with sodium dehydrocholate which is again a good bile stimulant (Sterner

TABLE IV Influence of sodium dehydrocholate on the toxicity of other bile salts in mice (average weight 20 gm.)

		Dose in	Sodium dehydro-	Number of	Numb				
Drug		mgm.	cholate, mgm.	mice	1	2	3	4	Survival
Bile salt		4 4 6 8	 8 8 8	3 12 12 12 12	3  2 3	· · · · · · · · · · · · · · · · · · ·	i. i		12 8 6
Sodium cholate	0	5 6	8	3 6	3 1		••		5

The yield never exceeded 18 grammes per litre, whereas Wieland and Weyland (1920) recorded a yield of 25 grammes of cholic acid per litre of the bile. The sodium cholate is also considerably hæmolytic (vide table II), but is slightly less toxic than the natural bile salt. This salt also on injection produces cardiac depression

with subsequent collapse and death.

The sodium salt of dehydrocholic obtained by oxidizing the cholic acid is, however, found to be practically non-hæmolytic (cf. Ziegler, 1931 and 1932). It is also considerably less toxic than the other salts. Table III shows that for male white mice the minimum lethal dose in milligramme per gramme body weight is 0.2, 0.25 and 1.5, respectively, for natural bile salt, sodium cholate and sodium dehydrocholate. During the course of injection of these various salts it has been invariably noticed that the bile salt, as well as the sodium cholate, produces tissue necrosis (cf. Ziegler, 1930). The sodium dehydrocholate is, however, free from such side reaction. On injecting the latter salt in a dose of 0.8 mgm. per gramme, or higher, into mice, a peculiar symptom of dancing round the cage was noticed. The animals began to run to and fro, then suddenly quieted down and started gasping. This salt is, however, better tolerated by the mice if it be injected at a lower concentration or after dilution with normal saline. Sodium dehydrocholate is further found to lower the side reactions and the toxicity produced by the administration of natural bile salts. from table IV, it is evident that the mice treated with 8 mgm. of sodium dehydrocholate tolerated the minimum lethal dose (0.2 mgm. per gramme) of the natural bile salt, and the mortality in the group of animals treated with 0.4 dose of mgm. per gramme fell et al., 1931) without any appreciable toxic property in its clinical doses (cf., Adlersburg and Neubauer, 1926; and Wakefield et al., 1929).

#### Conclusion

The Indian ox bile collected from the local slaughter-house is invariably of poor quality.

The bile salts present in it are toxic and extremely hæmolytic as usual, but the sodium salt of dehydrocholic acid, prepared by oxidising the cholic acid isolated from the above bile, is much less toxic and is practically non-hæmolytic.

From the preliminary experiments so far carried out, it seems that sodium dehydrocholate increases the tolerance and lowers the side effect produced after the ingestion of natural bile salls.

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OF CALCID FUMIGATION AS RÔLE RATICIDAL AND PULICIDAL MEASURE IN ANTI-PLAGUE CAM-PAIGN

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BUBONIC plague is primarily and essentially a disease of rodents, especially rats, and is carried from rat to rat by fleas. It may however under suitable conditions affect man through the agency of fleas. Man's contact with the infection depends upon his contact with the rat and its fleas. Man's chance of escape from this disease is therefore conditioned upon the effectiveness of the campaign against these pests.

Were it possible to exterminate all rats within the endemic areas or render them immune, plague would disappear immediately. The possibility of the total extermination of rats has exercised the brains of people of all lands and ages, but the problem has yet to be solved. The animals breed at such a rate as to render futile all attempts at extermination. Calculation of the reproductive powers of rats bewilder imagination—one pair may give rise to as many as 900 rats in one year.

Fortunately, it is found by experience that the total elimination of rats in a locality is not absolutely essential for the eradication of plague. If the rat population is kept within low limits, rat centres are destroyed and such rats as do exist are well scattered and not congested, rat plague will disappear from a locality.

Under the present circumstances, therefore, the mainstay of all anti-plague measures, besides the permanent works including rat proofing, sanitary measures and health education of the masses, is rat and flea destruction so as to reduce their population to a low figure. This is a great safeguard against rapid spread of plague.

The special plague department, Hyderabad Deccan, carries on a continuous and well-organized anti-rat campaign throughout the year with very successful results. The anti-rat campaign as carried out by this department consists of baiting, trapping and fumigation.

Advantages of fumigation over baiting and trapping

(1) Traps and barium carbonate baits are only partially effective as they do not destroy the fleas at all. Since fumigation deals with both rats and fleas, it is undoubtedly the best of all available temporary plague measures. One of the most difficult problems in plague prevention was a local tolk with both vention was how to deal adequately with both rat- and flea-infested houses. The situation is apth. aptly summed up in the 1932-35 report of the Haffkine Institute, Bombay, which says:—

'In the past, rat baiting and trapping combined with the use of kerosene oil emulsion have been our chief methods of attack. These methods do not prove effective; the results obtained were hardly commensurate with the amount of labour involved. But the position has entirely changed with the advance of industrial chemistry which has placed at our disposal a number of calcium cyanide preparations which when suitably used ensure a rapid and effective destruction of rodents and, what is very important, their fleas. Baiting and trapping of rats did not affect the flea problem at all'.

(2) Recent observations have shown that favourable incubating conditions (temperature and saturation deficiency) prevail in underground rat holes and that infected rat-fleas can easily survive the usual short off-season during the summer months, and are probably therefore a factor in the carrying over of plague from one

season to another.

If that is true, fumigation will prove to be the most valuable measure known for the destruction of these incubating fleas and in preventing the recrudescence of plague.

(3) Fumigation is the quickest and surest

method of rat destruction.

The wily rat is taken unawares and nothing is left to its choice. None of the rats and fleas in the rat holes are left alive.

(4) As most of the rats after fumigation die in the burrows out of sight, the process is less annoying to certain sections of the public who object to seeing rats being trapped and killed. The bad smell from decomposition of baited rats due to death in inaccessible situations is also avoided. It is a very important factor in actual practice.

(5) Fumigation kills not only rats and fleas but also snakes, ants, porcupines, and termites, and therefore ready co-operation of the public

is usually forthcoming.

(6) Fumigation is easily applied—all that is required is to blow a very small quantity of the material into a rat hole, to close it and leave it -no rats or fleas will remain alive in it.

(7) The fumigation method is simple and requires less staff. Expenses required for repairs

are also negligible.

(8) Under proper supervision and in trained hands, fumigation can be done with hardly any danger at all to human beings.

(9) Because of the advantages mentioned above fumigation is gradually replacing other

measures such as baiting and trapping.

Baiting may however be used as an adjunct to fumigation, and trapping is essential to find the index of the prevalence of rats in any area (rat-density), as an indicator of the results of baiting, for catching rats that are bait-shy and have escaped baiting, and as a means of obtaining flea-indices and making flea surveys. Baiting and trapping will also be required to destroy rats which cannot be dealt with by fumigation, such as those residing in inaccessible situations,

and in thatched and tiled roofs which unfortunately abound everywhere.

#### Fumigation

The use of poisonous gases for the destruction of rats has long been recognized and adopted by sanitary authorities all over the world.

Various substances have been used for this purpose, but only three need be seriously considered as fumigants, namely, carbon monoxide, sulphur dioxide, and hydrogen cyanide.

#### 1. Carbon monoxide

This gas is produced by the incomplete combustion of coke or charcoal in a closed stove. It is usually combined with carbon dioxide when used as a fumigant. Its dangerous nature and the complicated machinery required for its production preclude its usefulness on land, though it is still employed for ship deratization under proper supervision. It is reputed to be non-lethal to fleas.

#### 2. Sulphur dioxide gas

Sulphur dioxide gas can be generated from Clayton machines. In the Punjab a convenient method of smoking rat holes with sulphur dioxide has been in use in the form of candles called bhoosa battis, which are a modification of Lane's neem battis. This consists of a mixture of chopped straw, red pepper, sulphur, potassium chlorate, and potassium nitrate wrapped in an oily paper and provided with a gauze wick which is lit and placed in the burrow.

Sulphur dioxide gas is relatively cheap, easy to generate and less dangerous to handle, but apart from this, it cannot compare with hydrogen cyanide gas in efficiency, speed of action and ease in handling. It also corrodes or tarnishes metals, paints, etc., and ruins food-stuffs and cereals, fabrics and delicate articles; it is also less diffusible and has lower penetrating powers. After experiments here in the laboratory and carefully controlled trials in the field, it was proved that cyanogas was much more efficacious than sulphur dioxide. Use of sulphur dioxide was given up by this department about five years ago.

#### 3. Hydrogen cyanide

Fumigation with hydrogen cyanide has been employed for a number of years particularly for the destruction of vermin, and pests in ships, and for the destruction of bugs in infested houses. In fruit-farming too, certain destructive pests have been successfully attacked by this means. But it is only in recent years that experiments have been carried out which have proved that cyanide products are powerful lethal agents for rats and rat-fleas and that they are therefore valuable weapons in the fight against plague.

There is no question of the superiority of cyanide products over carbon monoxide or sulphur dioxide gas. Both experiments and practical experience here have proved time and again

their deadly effect on rats and fleas, their diffus. their deadly effect of their deadly effect of their deadly effect ibility, penetrating power, toxicity in small doses, ibility, penetrating power, toxicity in small doses, and harmlessness to delicate articles.

Many products have been used.

(a) Pure hydrocyanic acid is used in some countries for fumigation of vessels under proper supervision, but it is too dangerous to use on land.

(b) Zyklon-B consists of 95 per cent hydrocyanic acid and 5 per cent chloropicin (as a warning gas) impregnated in Fuller's earth or kieselguhr. It is used for funigation of ships under supervision but is too dangerous for use on land.

(c) Calcium cyanide products:

For practical purposes, only two preparations, viz, calcid and cyanogas dust 'A', are worth considering as far as fumigation on land is

(i) Calcid is supplied in briquettes (tablets) of 20 grammes each. These are composed of calcium cyanide 88.5 per cent and 11.5 per cent of almost pure lime. Powdered calcid produces just over 50 per cent of available hydrocyanic acid.

(ii) Cyanogas 'A' dust is a compound consisting of 45 per cent calcium cyanide and 55 per cent slaked lime. Cyanogas produces about 23 per cent of available hydrocyanic acid. Cyanogas is supplied in the form of powder and

a special foot pump is provided for use. Both calcid and cyanogas 'A' owe ther value to the fact that when powdered and exposed to air these are acted upon by the atmospheric moisture, form hydrocyanic acid gas, and leave behind a residue of slaked lime.

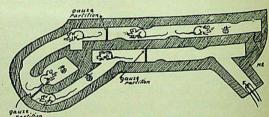


Fig. 1.—Artificial rat-burrow for experimental purposes.

#### Experimental data

Experiments were carried out at the plague department laboratory, Hyderabad Deccan, and measure the relative potency of 'cyanogas and calcid for fumigation purposes.

An artificial run (figure 1) 5 inches deep inches 5 inches wide and 18½ feet long consisting of four divisions of equal length separated by fine wire gauze is constructed. This is roofed in by glass held down at the construction of the construction. glass held down at the sides with mud, so that the whole run is an army the same the whole run is open to observation. The same run is used throughout.

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For each test 2 adult rats and a muslin page ntaining 5. containing 5 fleas are introduced into the section of the run except in the first. Thus section of the run except in the first. rats and 15 fleas are used for each test.

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open end of the run the nozzle of the 'baby open on cyanogas pump is inserted and packed round with mud.

A measured quantity of the product to be tested is blown into the run and a stop watch started. As soon as the powder escapes from the opening at the other end, this is sealed with mud. The rats are watched through the glass, and, as soon as they appear to be dead, the time is noted and the glass roof removed to expose the rats to fresh air. The rats are left in the open channel for another 10 minutes and then put in cages and removed to a room for examination after 24 hours. The time of exposure given in the tables is the time between the blowing in of the dust and the removal of the glass roof. The number of escapes are the animals that are found alive on the second day in cages. The muslin bags are removed from the run at the same time as the rats, and fleas are kept in glass jars covered with muslin and examined the next day.

#### A. Cyanogas 'A' dust

	A. Cyuni	oyus A u	ust		
Number of experiment	Quantity of product used, grammes	Duration of exposure before breathing stopped, minutes	Deaths, rats	Deaths, fleas	
1 2 3 4 5 6 7	5 10 15 20 30 40 50 60	  5 2 2 2 10 10	 1 2 2 4 6	 5 5 15 15	
1000-61	B. Calc	id briquette	28		
1 2 3 4 5 6	1 2 3 4 5 6	 5 8 8 7 7	1 3 4 5 6	5 10 10 10 15 15	

Note.—Six rats and 15 fleas are used during each experiment and the findings confirmed by several repetitions.

Relative potency of the two products tested

These results are considered to demonstrate that 6 grammes of calcid are at least as efficacious as 60 grammes of cyanogas dust and are sufficient to kill all rats and fleas in an ordinary

The hydrocyanic acid content of calcid being only twice that of cyanogas, it appears that the greater efficiency is in part due to the form of blower recommended for use with calcid. This blower grinds the blocks of calcid into a very fine powder and blows it with sufficient force to distribute and blows it with sufficient force to distribute the powder in lethal quantity to the extreme end of an eighteen-foot run.

The cost of cyanogas powder is Re. 1-8-0 per lb. and of calcid Rs. 3-4-0 per kg. (24 lb.). As efficient results are obtained with one-tenth the quantity of calcid this product is far less expensive for fumigation of rat runs. These poisonous chemicals should only be used by trained and trustworthy workers, and greatest care is necessary to see that by no possibility are people or domestic animals exposed to the fumes, and no rat-run should be fumigated until all terminal and lateral openings are ascertained and closed.

Calcid and cyanogas compared as fumigants

1. Laboratory experiments described above and regular and extensive field-work carried out in the inhabited areas in this State have proved that calcid is much more efficient and economical

than cyanogas.

2. In spite of its high potency as a rat and flea destructor its use is quite safe in trained hands. This has been definitely shown by practical experience spread over several years. Furthermore, it is not necessary to vacate the houses for any length of time. The occupants can return very soon after the operation is finished.

3. Furthermore, the effects of calcid are more lasting and the rat holes once fumigated with calcid are not re-opened for a much longer period than when closed after cyanogas.

4. Calcid too is supplied in solid briquettes which do not evolve any great amount of gas when merely exposed to the air unpowdered. It is far easier to measure and regulate the quantity and thus avoid unnecessary waste of materials and time, than is the case with cyanogas 'A' powder.

5. A special apparatus ('baby duster') is provided by the makers for using this preparation. It is a combined grinder and blower. It grinds the tablets to a very fine powder and at the same time a powerful fan drives the powder further along the burrow and does it more quickly and more evenly than is the case with the cyanogas pump.

In the case of cyanogas 'A' dust the blower is not so efficient and deposits a considerable part of the powder in that part of the burrow nearest to the blower, only a small proportion

being carried into the deeper recesses.

The blower is worked by hand and is much lighter and easier to work than the cyanogas foot-pump. Considering the labour involved and the range of efficiency, calcid is much superior to cyanogas and should be recognized as the fumigant of choice for rat and flea destruction.

#### Calcid fumigation

The plague department, Hyderabad Deccan, gave up the use of cyanogas 'A' dust four years ago and have adopted calcid fumigation as a raticidal and pulicidal measure with successful results. The rat-density and flea-index

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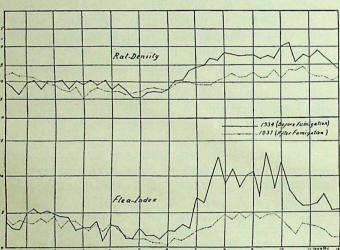
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have gradually come down, chiefly as a result of intensive and organized calcid fumigation carried out continuously throughout the year. The reduction in the flea-index is very marked and significant; while it rose to as high a figure as 13 in 1934, it did not go beyond 5 in 1937. Figure 2 shows the flea-index and rat-density week by week for the year 1934, before calcid fumigation was started, and for the year 1937, two years after the adoption of calcid fumigation. These low figures are partly responsible for the low incidence of plague in Hyderabad City (Deccan) during the last three years.



2.—Comparative chart showing rat-density and flea-index before and after calcid fumigation.

The number of houses fumigated and number of rat holes closed annually in Hyderabad city and suburbs are given below :-

Year	Houses fumigated	Rat holes closed
1936	67,603	866,321
1937	00 041	1,158,721
1938	66 257	881,974

Hyderabad Deccan appears to be one of the few cities in India where calcid fumigation has been carried out on an extensive scale.

It is interesting to note that all this has been done without an untoward accident of any kind.

On account of the dangerous nature of the preparation, calcid has not yet been taken up for use on an extensive scale in many parts of India. With proper control and under trained supervision there is no danger of any kind in operating this valuable product in inhabited areas, as has been done so successfully in Hyderabad city. These operations have now been started throughout the Hyderabad Dominions with excellent results.

Fumigation is carried out under the supervision of a trained medical officer, health inspector, or health sub-inspector, and all necessary precautions are undertaken. An antidote outfit is always kept at hand in case of emergency.

(Continued at foot of next column)

## PROVISION OF LATRINE ACCOMMODA. TION IN VILLAGES

By T. R. RANGASWAMI, M.B., B.S., B.S., B.S.S. CAPTAIN, A.I.R.O. Indian Military Hospital, Bangalore

Bore-Hole latrines work satisfactorily and there is no nuisance on the ground of smell Further, they require very little space for erection. A bore-hole latrine used by four persons will last almost permanently without the necessity of its being shifted from one place to another, provided tree growth is encouraged around it. If there are more than four persons in a family it is recommended that one seat be provided for every four persons. The tree or crop may be lime, orange, mango, sapota country goa, papaya, banana, margosa, pungan, raintree, pooarasu, avisichettu, or seema-chintachettu or any other tree which may suit the convenience of the parties concerned. One individual on a mixed diet evacuates 6 oz. of nightsoil and 40 to 50 oz. of urine per day and the nitrogen content of these comes to about 10 pounds of organic nitrogen in one year. The idea of growing trees is to deplete the soil of this and thus keep it sweet and clean round the latrine. Trees near bore-hole latrines grow very much better than trees elsewhere under similar conditions. The writer had occasion to put a latrine between two trees on a road margin. The two trees on either side of the latrine swelled in girth and the leaf growth increased enormously within a month, in marked contrast to the other trees that were in the same row and did not show any extra increase in size. It was a useful demonstration to the public of the high manurial value of a bore-hole latrine. From the public health point of view it keeps the soil and the air pure. Further, the nitrogen can be utilized for the growth of useful fruits rich in vitamin C, or of green leaf for cattle or goats, or converted into edible green leaves rich in vitamin A. If preferred, the leafy growth of trees can be cut and used as green manure. This is greatly in demand especially in deltaic areas. Tree growth will keep the place cool, allay the dust nuisance, and will add to the fuel and thus release cowdung for the fields; as it is now, a certain amount of dung is converted into dung cakes for fuel, which is an economic loss.

(Continued from previous column)

For each machine three men are necessary supplied with calcid, the pump, a spade and a basket of damp clay or mud for sealing rat

It is not intended to discuss in this article the details of the actual operation of calcid fumigation and the precautions to be taken.

My thanks are due to Dr. H. Hyder Ali Khanks.c.s. (Edin) F.R.C.S. (Edin.), the Director, Medical and Public Health Department, H. E. H. the Nizanis Government, for his part of the Publish these Government, for his permission to publish these notes. , 1940

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In these days when much attention is paid to the conservation of humus in soil of intensively cultivated areas, every attempt should be made to conserve humus, especially when lack of attention in dealing with the night-soil problem is a distinct danger to the community. With a little amount of forethought this dangerous material can be converted into valuable humus. Calculating organic nitrogen value on the basis of groundnut cake cost at Rs. 50 per ton which contains 8 per cent nitrogen, the manurial value of the contents of a bore-hole used by four persons will be worth about Rs. 12-8-0 in a year. The capital cost per individual for providing a bore-hole latrine comes to Rs. 25 for one seat Rs. 6-4-0 per individual 4 users, and this initial outlay, in addition to solving the latrine problem gives an indirect return of 50 per cent which will more than cover the interest, depreciation and maintenance charges. The indirect benefits to the garden by letting in the air to a depth of 18 feet in soil are (1) aeration of deeper layers of soil, (2) by giving facilities to tree roots to go down near the sides of bore holes potassium from the deeper layers of soil will be sucked up to the surface, (3) increase in the live and active layers of the soil. Thus the bore-hole latrine scheme can be made to pay for itself and valuable organic matter can be conserved in the soil, and human beings will get the benefit of suitable latrine accommodation resulting in diminution in the incidence of hookworm and other intestinal parasites, and cholera, typhoid, diarrhœa and dysentery bacilli will be killed by coming in contact with septic material. The rich and certain harvest in the betterment in the public health is a benefit of incalculable value. A rough estimate is given below :-

Turk			Rs.	As	. P
Latrine slab Boring charges			2	8	0
Zinc sheet			1	8	0
Timber, etc.			10	0	0
Construction obover			3	0	0
Unforseen charges			3	0	0
charges	•••	••	5	0	0
	TOTAL		25	0	0

For places where other materials such as tatties, bamboo matting, coconut or palmyrah leaves, or date matting are available, or where planks are cheap, the cost of zinc sheets can be avoided. The main thing is to have the boreholes and slabs, and to adopt any suitable screen from old zinc sheets, empty tar barrels or oil barrels. Mud walls can be erected wherever

The writer of this note has observed bore-hole latrines used by four persons per seat working for more than three years without a tendency to fill, without the neceswithout emitting smell and without the necessity of reharing Smell and without the necessity of reharing smell and without a tendence of Public Health, sity of reboring. The Director of Public Health, Madras, inspected some of the latrines in the Nilgiris and had occasion to remark on the

(Continued at foot of next column)

NOTE ON THE PRODUCTION OF AGGLU-TININS IN THE BLOOD OF INDIVID-UALS AFTER PERORAL AND SUBCU-TANEOUS VACCINATION BY TYPHOID AND PARATYPHOID VACCINES

By E. SOMASEKHAR, M.R.C.S., L.R.C.P., D.P.H., F.R.C.S. (Ed.)

There have been numerous reports by various workers on the production of agglutinins in the blood after the administration of vaccines by mouth. The following investigations undertaken to study the production of agglutinins in the blood of volunteers, using such vaccines as were available locally and have been used in the prophylaxis of enteric fever.

The subjects, 94 in number, were workmen in the medical, loco. and engineering departments

#### (Continued from previous column)

absence of smell and inquired whether any special arrangements had been made to eliminate it. All the sanitary staff in the district are impressed with the advantages, or real necessity of having tree growth, and the secret of success was in their understanding the details and implicitly carrying them out as a routine.

#### Summary

- 1. An economic method of approaching the problem, the scheme being self supporting, is outlined.
- 2. Tree planting is encouraged with direct and indirect benefits. One cannot over-emphasize the necessity for tree planting.
  - 3. Soil is kept sweet and pure.
- 4. Destruction of bacteria of typhoid, cholera and dysentery from carriers from the moment of evacuation occurs, as they come in contact with septic material.
- 5. Hookworms and other intestinal worm infections will be prevented from spreading, as contact with feet of human beings is avoided and flies cannot get access to the disposal chamber.
- Green leaf and manure is made available and more profitable, and vitamin-yielding fruits as well as leafy matter can be made available.
- 7. It is æsthetic and entirely free from bad odours or gases.
- 8. It is the most natural method of dealing with the problem. Dangerous filth of human beings used as food for plants and plant products (only too welcome to human beings) are made readily available.
- 9. Contamination of wells rarely happens in practice and can be completely eliminated if for 35 feet round latrine seats trees are grown at intervals of 6 feet.

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of the M. and S. M. Railway at Guntakal. A preliminary examination of their sera revealed that agglutinins were not present in their blood, except in four who showed a titre varying from 25 to 50 for Bacillus typhosus. These were reported to have either had inoculations or attacks of enteric fever previously. These four and one absentee were excluded and the remaining 89 volunteers were divided into four groups. The first three groups consisted of 29, 29 and 27 individuals, respectively, while the fourth constituted a special group of only four volunteers.

The men in each of the three major groups were workmen doing heavy manual labour and were living in the railway colony, or just outside it, obtaining their food supplies from the same area and water from the same source. average ages of each of these groups were 29.31, 32.5, and 27.11 years, respectively. Their habits of living were similar in nature and the incidence of previous infection, if any, was insignificant. This was borne out by the absence of specific agglutinins to either B. typhosus, or the paratyphoids prior to their coming under observation.

None of them developed any illness, of any serious nature, during the 12 months they were under observation, so that the question of any non-specific response which would influence their agglutinin titre at the end of the year was also eliminated.

It should therefore be noted that these groups were more-or-less homogeneous as regards their age, work, diet, and the incidence of previous and subsequent infection if any.

To each individual of these groups was administered vaccine either by mouth or subcutaneously as noted below :-

#### Group I. Oral vaccine, bilivaccine (La Biotherapie Laboratory, Paris)

Received adult dose consisting of three tablets of bile pills followed by three tablets of vaccine during three successive days. The bile pill was swallowed in the morning on an empty stomach, and this was followed by vaccine tablet 4 hour later. No food or drink was allowed for at least one hour after. This was repeated on the following two mornings.

## Group II. Oral vaccine, typhoral (Bayer)

Received adult dose of one dragée (tablet) of typhoral (Bayer) in the early morning on an empty stomach; this was repeated the following two mornings and no food or drink was allowed for an hour after.

No preliminary administration of bile.

#### Group III. Subcutaneous inoculation, trivalent TAB vaccine (Guindy)

Injected subcutaneously with 0.5 c.cm. trivalent (TAB) vaccine followed a week later by 1 c.cm.

#### Group IV

Received three tablets of vaccine (bilivaccine, La Biotherapie Laboratory, Paris) per day on La Biotherapie La Brotherapie a preliminary three consecutive mornings after a preliminary

Composition of vaccine administered was as follows :-

Bilivaccine (La Biotherapie Laboratory, Paris)

Each tablet contains of 50 mgm. of heat-killed and desiccated Eberth bacilli and para 'A' and 'B' of different origins.

#### Typhoral (Bayer)

A proprietary product containing the antigens effective against typhoid, and paratyphoid A and B in lysated form.

Prophylactic trivalent vaccine (King's Institute, Guindy)

Each c.cm. contains :-

- B. typhosus 1,000 millions.
- B. para 'A' 750 millions.
- B. para 'B' 750 millions.

#### Method of examination of blood

From individuals in groups one and three, 5 c.cm. of blood were drawn and sera tested at intervals of one to two weeks, until the ninth week and thereafter during the ninth month, and also at the end of one year. In group two the sera were tested at the end of one week, nime months and 12 months.

The technique for agglutination was by the macroscopic method, since it was the routine in use and it was considered more accurate, and s large number could be tested at a time. The dilutions used ranged from 25 to 3,200 in cases of B. typhosus until the ninth week, thereafter to 800, while those for A and B ranged up to 200 during the whole period of observation. together 416 sera were examined.

The composition of the suspension used for the agglutinin test was 0.1 per cent formaling ized emulsion of B. typhosus para A and part B, containing 1,000 millions of organisms per 1 c.cm. standardized by the opacity method, and the test tubes the test-tubes in which the test was made were incubated in a water bath at 55°C. for two hours The racks were allowed to cool and careful readings tolerand readings taken against a saline control at each examination.

The agglutinins tested were for general representations ponse and not for either H or O, separately.

The results and H The results and the reactions are tabulated in table I which are self-explanatory.

In tables II and IIA are given the results of the tests in the groups treated orally with preminary bile and vaccine pills—ordinary dost and three times the advocated dose. It will seen that no acceptation seen that no agglutinins were present, in

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number tested with ordinary dose (table II) until the seventh week, while five out of the 15 in the ninth week, and two out of 13 in ninth month, showed agglutinins to a low titre. Even such

TABLE I

	Number under observation	Height of responses	Interval after which obtained	Remarks
Group I. Oral vaccine, bilivaccine (La Biotherapie Lab., Paris).	29	T. 25 B. 25	9th week	No systemic response of any kind.
Group II. Oral vaccine, typhoral (Bayer).	29	T. 50 A. 25	1st week	No systemic response of any kind. Only two out of 29 showed agglutinins during the first week.
Group III. Subcutane- ous inocula- tion, tri- valent TAB vaccine (Guindy).	27	T. 400 B. 50	1st week	Everyone of them showed mild local general reactions after the injections but the reactions were so severe after the second that six of them had to be placed off-duty.
Special Special	4	T. 100	5th week	No systemic reaction of any kind although three times the advocated dose was administered perorally.

Table II
Summary of the response in group I

	, coponie in group 1							
	Weeks							nths
	1	2	3	5	7	9	9	12
Number examined * Number positive Number negative B. typhosus (1 in 25). Para A Para B	29  29 	27 27 	25 25 	24	16 16 	15 5 10 4	13 2 11 2	14 14 

<sup>\*</sup>Signifies number positive for B. typhosus, para and above.

titres were not obtained at the end of a year, but the special group of four (table IIA), who received three times the advocated dose of the vaccine, showed agglutinins to B. typhosus for

varying titres from 25 to 100 commencing from the fifth week, and maintained that level till the end of 12 months. This signifies a better response when doses larger than those advocated are given. Further observations on a larger number of cases are required to confirm this result.

Table IIA
Summary of the response in group IV

	Weeks				Months		
	1	2	3	5	9	12	
Number examined	4	4	4	4	4	2	
* Number positive				4	4	2 2	
Number negative	4	4	4				
B. typhosus (1 in 25)				4	4	2	
Para A							
rara b				3			

\*Signifies number positive for B. typhosus, para A or B individually or in combination from 1 in 25 and above.

Table III indicates the result of the group treated with oral vaccine (typhoral) and it will be seen that at the end of a week two out of 38 examined showed agglutinins for B. typhosus to titres of 25 and 50, while at the end of nine months 11 out of 18 showed agglutinins for B. typhosus and in some cases for paratyphoid A and B. These were still present at the end of 12 months.

Table III
Summary of the response in group II

Time interval	1st week	9th month	12th month
Number examined * Number positive Number negative Percentage	28 2 26 7.1	18 11 7 61.1	20 9 11 45
B. typhosus (1 in 25 and over).	2	11	9
Para A (1 in 25 and over).	••	2	
Para B (1 in 25 and over).		2	3

\*Signifies number positive for B. typhosus, para A or B individually or in combination from 1 in 25 and above.

The response of the group subjected to subcutaneous inoculations is given in tables IV and IVA. The agglutinins appeared from the first week onwards and continued to be present right through to the end of the year. The percentage of response ranged from 56.5 to 76.9 which is a little less than that quoted by Dakeyne (1915). The duration of the response and the height of the titres reached varied considerably. The highest agglutinin titre reached was 1 in 3,200 for B. typhosus in the third week, which however fell very rapidly to 1 in 400 in the fifth week.

The total number showing positive response over a period of one year was however large, thus confirming the observations of Dakeyne (1915).

TABLE IV Summary of the response in group III

		V		Months			
	1	2	3	5	9	9	12
Number examined	25	27	26	26	23	20	18
* Number positive	18	19	20	19	13	14	13
Number negative	7	8	6	7	10	6	5
Percentage	72	70.4	76.9	73.1	56.5	70	72.5
B. typhosus (1 in 25 and over).	18	19	20	19	11	14	11
Para A				2	3	3	1
Para B	1	i		2 3	3 6	3 1	1 3

<sup>\*</sup>Signifies number positive for B. typhosus, para A or B individually or in combination from 1 in 25 and above.

TABLE IVA

Showing the variation in and height of titres obtained at the various periods in group III

					Months				
			1	2	3	5	9	9	12
B. typhosu	s titre	s-						- 1	
1 in	25		1 2			7		4	4
1 in	50		2		3	7 4 2 5 1	1	4 5 2 3	4 5 2
1 in	100			4 1 3 5 3 3	4 5 5 1 1	2	6	2	2
1 in	200		10	3	5	5	6 3 1	3	
1 in	400		5	5	5	1	1		
1 in	800			3	1		• •		• •
1 in 1	,600			3	1				
1 in 3	3,200	••	••	••	1		••	••	
Para A titr	es-								
1 in	25					1	2	3	
1 in	50					$\frac{1}{1}$	2		
1 in	100								i
Para B titr	es—								
1 in	25			1		1	3		3
1 in	50		1			1 1 1	3 2 1	1	
1 in	100				• •	1	1		

It will be observed that the response for agglutinins was obtained from the sera of the individuals subjected to both oral and subcutaneous vaccination, but the response with the usual dose of vaccine was greatest in the inoculated as against the orally vaccinated.

The earliest period of the appearance of the response for agglutinins was five weeks in the orally vaccinated, if we exclude the two who responded a week after the administration of typhoral, while the response after the inoculation was positive after the first week and continued right through the year. This is quite

consistent with the observation of Park (Kolmer, 1923) as the antigenic action of orally administered vaccines can only come into play after absorption, while the antigens are introduced directly into the vascular system in inoculation

Although neither the short interval before the response, nor the high titres obtained after oral vaccine, as noted by Hoffstadt and Thompson (1929), were observed in this series, they correspond with the observation of Giglioli (1933), who could not find any response for agglutining from the fifth to 15 days, following oral administration of vaccine.

In all the individuals of the various groups, the response for typhoid organisms was more than for either para A or B, as observed by the previous authors. It was intended to continue these observations for a longer period and note the increase in response, if any, after the additional administration of an oral vaccine to the inoculated group, after the original titre had started to wane, but the exigencies of service have prevented me from continuing the work.

#### Summary

- 1. The agglutinin response with oral and subcutaneous inoculation of typhoid and paratyphoid A and B vaccines were tested in a group of 89 individuals.
- Agglutinins to a titre of 1 in 50 or 100 appeared as a rule in the case of the orally vaccinated only from the fifth week onwards and the titres remained low throughout the period of observation.
- 3. There appears some evidence that an extra dose of oral vaccine leads to a better production of agglutinins, as evidenced by better response when larger doses than those advocated are given. A larger number of cases should however be tested to confirm this observation.

Acknowledgment .- My thanks are due to Dr. R. J. Dyson, Chief Medical Officer, M. and S. M. Railway, for encouraging and helping me to come to the distribution of th Preventive Medicine, Guindy, for guidance in the work and supply of necessary materials, and to my assistant Dr. G. R. Rajaram who helped me right through the work. I have also to acknowledge the acknowledge the co-operation of the workmen who volunteered to peration of the workmen. who volunteered to further this investigation. My thanks are also due to the various firms who very kindly place, interest of the various firms who very kindly placed at my disposal a liberal supply of oral vaccines.

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# Indian Medical Gazette

#### APRIL

# COORDINATION OF THE MEDICAL SERVICES.

THE evolution of the practice of medicine throughout the ages provides a most interesting subject for study. For the moment we will consider it as a continuous process, forget the hiatuses, and ignore geographical considerations. Primitive man, like the dog to-day, probably licked his sores and when he was constipated ate grass, on the one hand, and, on the other, he instinctively fled from association with the sick and avoided poisonous plants, thereby practising both medical relief and prevention. Man became gregarious, and to save him from threatened extinction, as a result of epidemic disease, his most successful leaders became sanitarians and produced religio-sanitary codes, such as the Laws of Moses. The thought was for the herd, not for the individual, whether the leader were a sympathetic champion of the people or a despotic tyrant. Medical treatment was practised by the individual or the mother of the family on lines which she in turn had learnt from her mother. Specialization then appeared in the herd and those who could afford it paid others to treat them, but for the mass it was still home treatment and the Laws of From this system developed the physician and the surgeon, and, as man became more democratic and the individual more articulate, louder became his demand that his sufferings and those of his family should be relieved; the insistent demand of the halfeducated masses was, and still is, for medical relief, and, the laws of supply and demand coming into operation, medical science, which by this time may be said to have been born, adopted as its highest aim the treatment of the

But there were those amongst the more liberally educated who had a wider vision. The Laws of Moses, or their equivalents in other countries and amongst other peoples, had for the most part become unintelligent dogma, for they were usually distorted and even at their cumstances. Disease, it was realized, was not instances of the anger of the Gods, but in many 'preventible' became attached to a number of ible, why not prevented'. The more the matter was gone into, the longer became the list of preventible diseases, and the idea that all

diseases might be preventible—if only we knew how to prevent them—gradually began to take shape. This provided medical science with a new outlook and its highest aim ceased to be the treatment of the sick—which is only temporizing in the event of failure—and became the final banishment of all human disease.

In medically-advanced countries, when the child gets measles or his father cuts off his hand with a circular saw, not only will the physician prescribe for the child or the surgeon attend to the man's stump, but the medical officer of health will find out where the infection came from and if necessary close the local school, or the industrial hygienist will want to know why the accident occurred; he will not be content with the reason that the man broke certain regulations designed to protect him but he will enquire into the psychology of the man's actions and into such details as to whether it was fatigue or the monotony of his work that led to his carelessness.

This preventive medicine is too idealistic to stir the imagination of the masses; the restrictions that are entailed are irksome and, without the appeal of religious mysticism, often appear as senseless encroachments on man's liberty, even if they are not contrary to his religious principles, which they frequently seem to be, so that in these democratic days prevention usually has to take second place to medical relief, at any rate on the political platform. Another, perhaps more serious retrograde influence is to be found in the fact that this new spirit has not yet permeated the old established system of medical education, with the result that the doctor that is turned out to-day is not yet fully imbued with the preventive outlook; the public health diploma is looked upon as a necessity only for those who wish to specialize in preventive medicine, whereas it would be more logical if the qualifying examination required a knowledge of the general principles of medicine and a thorough training in preventive practice, leaving the more practical aspects of medicine, surgery, midwifery, and other subjects to those who wished to specialize in treatment. This may perhaps appear to be going a little too far; nevertheless the logical outcome of the evolutionary movement in medical practice must be prevention.

Let us see how these evolutionary changes have been interpreted in recent years in India. At the beginning of the century the practice of scientific medicine in the rural districts in India was represented almost solely by the government hospitals and dispensaries, staffed by assistant surgeons and sub-assistant surgeons who were under the district medical officer, or civil surgeon as he was usually called, and the civil surgeon of the province in their turn came under the surgeon-general or inspector-general of civil hospitals. The civil surgeon was also ex officio district sanitary officer, but his activities were

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mainly directed towards the hospitals and dispensaries, and for the crying needs of environmental hygiene he had neither the encouragement, official or unofficial, nor the inclination, or, if he had had these, neither the knowledge nor the power to do anything. That this was a very unsatisfactory state of affairs was appreciated, and probably the only suitable measure in the circumstances was adopted; a separate department with a separate budget was created in each province and placed under the charge of a sanitary commissioner. These sanitary commissioners, afterwards called directors of public health, had no clearly-defined duties, but in course of time they developed these, and the staffs with which they carried them out, in different ways in different provinces; the work they had before them was boundless, and their activities were only limited by their budget allotments and their personal energies.

There was ample work for both of these departments and there seemed little chance of their interests clashing or of their work overlapping and being duplicated, as long as the public health department concerned itself with strictly environmental hygiene, but it was impossible to continue to take this narrow view of their duties and the first suggestion of overlapping appeared in connection with certain diseases in which treatment is an essential part in the scheme of prevention, e.g., kala-azar (in the present state of our knowledge), tuberculosis, and leprosy. Maternity and child welfare provides another example; until recently a subject neglected by both departments, there seems a danger that it will provide the site for a water-hammer-like clash as both departments meet in the vacuum. Or, perhaps to take a more optimistic point of view, it will form the

point of contact which will extend into a broader line of junction and a possible eventually-complete fusion between the two departments. Elsewhere in this number will be found the opening address of the director-general of the Indian Medical Service at the Delhi Maternity Services Coordination Committee; in this address he has stressed the danger and the futility of this overlapping and has pointed out how easily it can be avoided.

We have said that this division of the departments was probably the best measure that could have been adopted in the circumstances, but had greater foresight been displayed at an earlier date the circumstances would not have arisen. One of the greatest disadvantages of the present system is that it creates in the minds of the laity the impression that in medical science there is a duality of purpose, whereas nothing could be further from the truth; no amount of friendly collaboration will nullify this impression.

We believe that the time has passed when this artificial division can serve any useful purpose, and that the next move must be the unification of the direction of the civil medical services. We do not suggest that the reform is an urgent one; on the contrary, we do not believe that there are yet available sufficient men with the necessary wide experience from whom the directors of medical services in the provinces must be selected, for the sanitary outlook and sanitary experience will be essential qualifications. The present system has worked well for many years and with a spirit of willing co-operation between the heads of the respective departments in the different provinces, it will probably continue to do so, but eventually, as medical science has only one aim, unification of directorate is inevitable.

# Special Articles

# HÆMATOLOGICAL TECHNIQUE PART III

By L. EVERARD NAPIER, M.R.C.P. (Lond.) and C. R. DAS GUPTA, M.B. (Cal.), D.T.M. School of Tropical Medicine, Calcutta

(5) Enumeration of reticulocytes

Reticulocytes, or reticulated erythrocytes, are young red cells; they represent the stage just after the cells have lost their nuclei and before they are fully mature. They are expressed as a percentage of the red cells; their percentage incidence gives information as to the activity of the red blood cell formation at the moment.

The reticulation may appear as a net-work over the whole cell, as a collection of discrete rods, or as granules. These are not shown by ordinary Romanowsky stains and a special supravital staining method is necessary to demonstrate the reticulation.

Staining methods.—Various dyes have been tried for staining reticulocytes, but brilliant cresyl blue has been found to be the best and it is now used universally. Although brilliant cresyl blue is the dye of choice, a number of different methods of using it have been suggested. Methods for reticulocyte staining may be classified in the following groups, in all of scrupulously clean and polished slides

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ave been brilliant best and brilliant umber ol suggested. be classiof which ides and coverslips without any scratches should be

used\* :-Methods in which a thin film of the dye is dried on the slide or coverslip and the blood

added later. B. Methods in which the blood is mixed with

a solution of the dye. With either method (i) a dried smear may be made, or (ii) a wet coverslip preparation.

Special apparatus required [for method of choice, B(ii)

Polished slides.

Clean coverslips (preferably  $22 \times 40$  mm.). Cresyl-blue solution 1 per cent in 0.85 per cent sodium

chloride. Capillary pipette. Rubber teat.

Vaseline or paraffin. Gas or spirit lamp.

Ehrlich's eyepiece (or some means of limiting the microscopic field).

Microscope.

Additional requirements for other methods Surgical pricking needle or 'blood gun'. Alcohol, ether, and cotton-wool.

Cresyl-blue solution 1 per cent in absolute alcohol. Wide-mouthed glass bottle

A (i) and (ii). Specimen tube Filter paper Leishman's stain } A (ii) and B (i). Distilled water

#### Method A

To prepare slides or coverslips proceed as

Make a 1 per cent solution of brilliant cresyl blue in absolute alcohol and keep it in a well-stoppered bottle. The slide may be prepared by one of the following methods:-

(a) Take a polished slide, heat it a little over a flame and put it on a flat even surface. With a capillary pipette take some brilliant-cresylblue solution from the stoppered phial and put a drop on the middle of the slide. If the slide is clean and it is on an even surface, the stain will spread concentrically and will be distributed in a uniform manner. The stain will dry in a minute or so; the slide is then ready for

(b) Put some stain in a wide-mouthed glass bottle. Warm a polished glass slide by passing it through a Bunsen flame, and holding it in a pair

\*Slides.—These should be cleaned and polished in the

following way:—

(i) Only new slides should be used. Put the slides in a glass jar containing spirit. Keep them soaked in spirit for over 24 hours

(ii) With a pair of forceps take out one slide at a time, allow the spirit to drain off the slide, and then

flame it over a spirit lamp or gas burner.

(ii) Polish well one side of the slide with jeweller's rouge, using a soft cloth. Mark the polished side with a glass pencil and keep it in a dust-proof slide box.

Coverslips.—Keep the coverslips in a wide-mouthed of fine forceps, take out one coverslip at a time, allow or gas burner, clean with a soft cloth and keep them covered in a small Petri dish till they are wanted.

of forceps dip it vertically into the jar of the dye up to three-quarters of its length. Take it out, allow the excess of stain to drain back into the bottle, and, before it is dry, put it in an upright position inside a specimen tube at the bottom of which a piece of blotting paper has already been placed. Put in the cork and allow it to stay over-night; take it out, mark one side with a glass pencil, and wipe the stain from the other side of the slide with a moist cloth; it is then ready for use.

Slides prepared in either of these ways may be kept for a long time in a dust-proof slide box and used when required.

(i) To prepare a dried smear, only slides prepared by the second method are suitable.

Put a drop of blood, oxalated or from the finger, on one end of a prepared slide and draw a very thin smear across the stained surface of the slide in the usual way—the use of a hæmocytometer coverslip as a spreader facilitates the drawing of a thin smear. Slides prepared in this way may be counterstained with any of the Romanowsky stains in the usual way.

(ii) To make wet coverslip preparations, slides prepared in either of the above methods

may be used.

Put a drop of blood, oxalated or from the finger, on the stained surface of a prepared slide, gently place a coverslip on the drop of blood, avoiding air bubbles as far as possible. If the drop of blood is not too big, it will spread uniformly under the pressure of the coverslip, but, in case it does not do so, apply very gentle pressure with the tip of the finger, so that the blood spreads evenly, but on no account should the coverslip be pressed hard, as some of the cells may be ruptured. Ring the coverslip round with hard paraffin by dipping a match in melted paraffin and stroking it on to the slide at the junction of the slide and coverslip.

#### Method B

In this method a small amount of blood is mixed with a quantity of dye in some definite

(i) Method of Osgood and Wilhelm (1934). Put 0.5 c.cm. of 1 per cent brilliant-cresylblue solution in 0.85 per cent sodium chloride into a small test-tube on a rack. Add an equal quantity of oxalated blood from a well-shaken flask. Mix well and allow the mixture to stand for about two minutes. Rotate the tube between the hands to get an even mixture.

Withdraw a little of the mixture with a capillary pipette and put a drop at one end of a polished slide. Make a thin smear and, when it is quite dry, counterstain with Leishman's stain in the usual way. The slide is now ready for examination for reticulocytes. A differential count of the leucocytes can also be done at the same time.

(ii) Modification of the above method. This is the method of choice.

Prepare a mixture of cresyl blue and oxalated blood as in the above method. With a capillary pipette take out a little mixture and put a small drop at about the centre of the polished side of a clean slide. Apply a clean coverslip on the drop of the mixture, when, under the pressure of the coverslip, the mixture will spread evenly; but, in case it does not do so, very gentle pressure with the tip of the finger may be applied over the coverslip. The preparation is then sealed with vaseline or paraffin and is ready for examination for reticulocytes only.

#### Counting the reticulocytes

Slides prepared by any of the methods described above are first examined rapidly with a low power (2/3rds objective), and a portion of the slide is selected where the cells appear discrete and these are not too many in one field. This portion of the slide is now examined with the 1/12th oil-immersion lens. The total number of red cells in the field and also the number showing reticulation are counted. The use of an Ehrlich's eyepiece, or a piece of metal with a square hole in it placed inside the eyepiece to narrow down the field, greatly facilitates the counting. Altogether one thousand red cells are counted in a more-or-less normal case, but if the count is high, 5 per cent or more, 500 red cells is sufficient; the number of cells showing reticulation is noted, and from this the number of reticulocytes per 100 red cells is calculated.

A Veeder counter, or some similar device, is useful here; one counts the red cells, and each time a reticulocyte is encountered clicks the Veeder. When a thousand red cells have been counted, the number on the Veeder is read.

In the absence of an automatic counter, a pencil and paper must be used, for it is a mistake to try to keep two sets of figures in one's head.

#### Comment

Osgood and others have shown that divergent results are obtained with the different methods in use. They obtained the best results with the method described by them, which has the additional advantage that a differential count of the leucocytes can also be done in the same preparation. We have, however, found that the modified Osgood method, which is the routine procedure in our laboratory, has given even better results in our hands than the original method. With the modified method all the reticulocytes stain very well and there is no clumping nor overlapping of the cells; thus, the counting is very much facilitated. With the original method a number of cells appear broken, more so in the case of anæmic blood, and the cells are less discrete. The percentage of reticulocytes appear to be slightly lower in the original than in the modified method. In a small number of cases where the counts were done by both methods, 5.16 per cent reticulocytes were found by the original method, against 5.98 by the modified method.

On account of the divergent results obtained by the different methods in use, for comparative studies a uniform technique should be adhered to in the enumeration of the reticulocytes, not only by one group of workers, but by all, so that the results of different workers will be comparable.

The modified Osgood method, described above, is simple and as it appears to be superior to the other methods in many ways, we recommend it as the method of choice for the enumeration of

reticulocytes.

#### Normal values

It is unnecessary to quote the figures of numerous observers regarding the normal percentage of reticulocytes. When, in a healthy individual whose red cells are at the normal physiological level, the hæmopoietic and hæmolytic tissues are functioning normally, the number of reticulated reds cells reaching the peripheral blood is less than one per cent of the total red cells. The normal range is usually given as 0.1 to 1.0 per cent. The present writers found a mean percentage of  $0.67 \pm 0.37$ in a series of 50 city-dwelling Indian males, with a range from 0.2 to 1.4, and 0.37  $\pm$  0.27 amongst 122 women. On the other hand, for Assam teagarden coolies the mean was  $2.17 \pm 1.92$  and the range 0.1 to 10.8 per cent. It is probably true to sav that reticulocyte counts in man of over 1.0 per cent are evidence of some unusual stimulation to the hæmopoietic system, though they may be encountered in an apparently healthy individual. In our Assam coolie series, we accepted these findings of unusually high reticulocyte percentages, associated as they were with a low hæmoglobin percentage, as evidence of some abnormality of the erythron in the individuals concerned.

#### Significance of reticulocytes

Whenever the hæmopoietic system meets an extraordinary demand for red blood cells, the reticulocyte percentage will rise, but the reticulocyte rise will not be maintained until the deficiency of the red cells has been made good.

For example, if a healthy individual loses a large quantity of blood, there is an immediate steady rise in the reticulocyte curve which reaches its maximum and falls to normal again within a few days, whereas it will probably be a few weeks before the loss of blood cells is made

Similarly, in deficiency anæmias, when the deficient substances, e.g., hæmopoietin in pernicious anæmia and iron in iron-deficiency anæmia, are supplied, the hæmopoietic tissues in the bone marrow are now enabled to meet the demand for red cells, and there is a rise in the reticulocyte percentage that starts within two or three days and reaches its maximum within five to ten days, after which it falls as fast as it rose.

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This reticulocyte rise gives a valuable indication that a deficiency has been made good.

A third example is in toxic aplastic anamia, where a toxin is depressing the function of the bone marrow. In this case there may be no reticulocytes at all to be found in the peripheral blood, but once the toxin is neutralized, or otherwise ceases to exert its toxic effect, the hamopoietic tissues will start to function properly, reticulocytes will appear in the blood, their percentage will rise to a maximum within a few days and will fall again to the normal level, but in the absence of any further intoxication the red cells will continue to increase until they reach their normal level.

It should be emphasized that whilst a reticulocyte crisis, as this sharp rise is called, is evidence that the hæmopoietic tissues are functioning effectively, a fall of reticulocytes to the normal level does not indicate any cessation of this functioning, but on the contrary it indicates that red blood cell formation is being carried on in an orderly manner.

In true hæmolytic anæmias, there is a constant reticulocytosis, as not only will the anoxæmia stimulate erythrogenesis, but there is a second source of stimulation in the debris of abnormal hæmolysis which has to be disposed of by the reticulo-endothelial tissues.

A constant reticulocyte count of 5 to 10 per cent or higher is evidence of excessive hæmolysis, and in a hæmolytic anæmia the return of the reticulocyte count to normal is usually evidence that the excessive blood destruction has ceased.

#### Reticulocyte crises

The extent of the reticulocyte response is governed mainly by the original level of the red cells in the anæmic state. For example, in a case of pernicious anæmia the rise in the reticulocyte percentage after the same adequate dose of liver extract may be as high as 55 per cent or practically negligible, according to whether the red cell count was 500,000 per c.mm. or 3,000,000 per c.mm. before treatment. Doubling the dose of liver extract would make no difference to the height of the reticulocyte response, but reducing it to an inadequate dose would. Therefore, in pernicious anæmia, if one has a chart showing the expected reticulocyte response, one can judge whether or not the dose of liver extract given was an adequate dose. We have given a chart here, not so much for practical use as pernicious anæmia is rare in India, but to demonstrate this point.

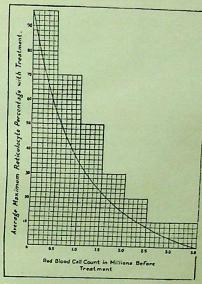
In iron-deficiency anæmia, the response to adequate iron therapy is also proportionate to the degree of the anæmia, but in this case the reticulocyte count does not respond with the same mathematical precision.

# (6) Enumeration of thrombocytes Thrombocytes, or blood platelets, are colouror pgar-shaped, and are usually about one-third

of the diameter of a red blood cell, but they may be larger, especially in pathological conditions.

No method of enumeration of blood platelets is entirely satisfactory, as platelets tend to form clumps and to stick to any foreign surface with which they may come into contact. However, with careful technique, counts sufficiently accurate for practical purposes are not difficult to obtain. The principal point to be remembered in the platelet count is that manipulation of the sample of blood should be avoided, and, if possible, the blood should be taken directly on to the counting slide.

#### CHART



Riddle's chart for calculating the maximum reticulocyte response expected in pernicious anæmia with adequate therapy.

The platelet count is expressed as a number per cubic millimetre of blood. There are several methods for estimating the number of platelets; these fall under the two main heads, the direct and indirect methods.

Apparatus required [for method of choice, B (i)]
As in the reticulocyte count.

Additional requirements for other methods

For method A.—Red blood cell pipette.
Sodium citrate 2 per cent solution (fresh and sterilized).

Counting chamber with Neubauer ruling and coverslip. For method B (ii).—Magnesium sulphate 14 per cent solution.

A. Direct method.—In this method the number of platelets per cubic millimetre is calculated without any reference to the red blood cell count.

Prick the finger with a sharp surgical needle and with a red-cell pipette draw blood up to the 0.5 mark and dilute it with fresh sterile 2 per cent solution of sodium citrate, up to the 101 mark. After gentle shaking, put a drop in the counting chamber, wait 3 to 4 minutes to allow the platelets to settle down, focus the light carefully, and count with the high power all the platelets in one square millimetre area. The

number of platelets per cubic millimetre of blood

is then calculated in the usual way.

B. Indirect method.—As in the enumeration of the reticulocytes, the platelets are at first expressed as a percentage of the red cells calculated from the number of platelets observed in counting one thousand red cells. The number of platelets per cubic millimetre can then be calculated from the total red cell count, which must be done at the same time. Of the many indirect methods advocated, the following two methods have given consistently good results in our hands :-

(i) Clean the tip of the finger first with soap and water, and then with alcohol and ether, and

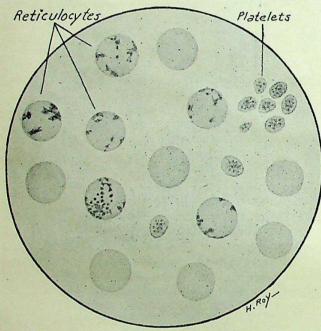


Figure showing six reticulocytes, seven mature erythrocytes, and nine platelets.

apply a thin layer of sterilized vaseline over it. Prick the finger with a blood gun or sharp pricking needle through the thin layer of vaseline. As the blood comes out, touch the uppermost portion of the blood drop with the centre of a  $22 \times 40$  mm. coverslip. Place the coverslip on a dried cresyl-blue-stained slide prepared by method A, (a) or (b), as described for the reticulocyte count. With very gentle pressure try to obtain as uniformly spread a film as possible, and finally seal the sides of the coverglass with vaseline or paraffin.

(ii) Clean the tip of the finger as above. Balance a drop of 14 per cent solution of magnesium sulphate on the back of the finger just above and to one side of the nail groove. Make a small puncture through the drop. The drop of blood should be such that the resultant blood mixture is about 1 in 20. Mix rapidly with a paraffined\* capillary pipette.

Transfer the blood mixture to clean slides, make very thin smears and stain with Wright's or Leishman's stain.

The coverslip preparation (i), or the slide (ii), is examined with an oil-immersion lens A small rectangular field is more convenient for counting than a big circular one (v. s.). Note the number of platelets seen in counting 1,000 red cells.

Successive fields from the different areas of the smear should be examined so as to eliminate, as far as possible, the error from uneven distribution. The red cell count is done in the usual

By a simple calculation the total number of platelets per c.mm. may now be ascertained Thus, if the total red cell count is 5,000,000 per c.mm., and if x be the number of platelets counted against 1,000 red cells, then  $x \times 5,000,000$ or  $x \times 5{,}000$  is the total number of platelets per c.mm.

Example.—Total red blood cells = 4,500,000 per c.mm. Number of platelets counted against 1,000 red cells = 50. Therefore:-

Platelets per c.mm. = 
$$\frac{50 \times 4,500,000}{1,000}$$
 or  $50 \times 4,500$  = 225,000.

The enumeration of the platelets by the indirect method, though more laborious and time absorbing, as a total red cell count has also to be made, is nevertheless much superior to the direct method. Results obtained by indirect methods, especially by method (i), are always higher than those of the direct method, as there is very little contact with foreign surfaces.

#### Normal values

The figures given by different writers vary considerably. This variation is undoubtedly due to some extent to the differences in the methods adopted for counting them, but there are considerable variations in the platelet counts done at different times by the same method in the same individual.

Whitby and Britton (1939) in Great Britain give the range as 250,000 to 500,000 per cubic millimetre and Gram (1920) in America as 280,000 to 540,000 with the average at 350,000. The present writers found 369,000 ± 248,000 in Calcutta and 423,000 ± 343,000 in Assam; in the latter series there were a number of so-called normal individuals. normal individuals with platelet counts of over a million and a half.

Gram, H. C. (1920). Arch. Intern. Med., Vol. XXV, 325.

Osgood, E. E., and Wilhelm, M. M. (1934). Journ. Lab. and Clin. Med., Vol. XIX, p. 1129.

The other references

The other references are given in the February 1940 imber. number.

<sup>\*</sup>Platelets do not adhere to a paraffined surface, so that if glass is covered with a thin layer of paraffin the platelets do not tend to adhere to it. The pipette is prepared by drawing hot melted paraffin wax through it; a thin layer of paraffin will adhere to the glass when it cools.

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## DRUG MANUFACTURE IN INDIA DURING PEACE AND WAR\*

By R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)

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#### DEMAND FOR CHEAP MEDICINE

As chairman of the Drugs Enquiry Committee, I realized that the root cause of the traffic in adulterated drugs is traceable, on ultimate analysis, to the demand by the people of this country, for cheap medicines. The western system of medicine is extending rapidly among the masses, and with it the use of medicinal drugs is going ahead. As many cannot afford to buy drugs of good quality on account of their high price, the demand for and sale of cheap drugs of poor quality and strength has been flourishing. Some unscrupulous manufacturers and dealers have not been slow to exploit this demand, and in the absence of restrictive laws certain classes of manufacturers and dealers, both in India and abroad, have successfully flooded the market with inferior products. The only remedy for this state of affairs lies in the organization of the drug industry in our country. It is only then that we shall be able to satisfy the conditions which might be prescribed by properly considered drug-control legislation, and to put on the market standard goods which the people need and which will suit their purchasing capacity.

In the report of the Drugs Enquiry Committee (1930-31), the difficulties of the local manufacturers in this country were fully discussed. The evidence disclosed the various disadvantages from which they suffered and which have hind-ered progress. The diversity of excise regulations for spirituous preparations was referred to, and during recent years there has been a certain amount of improvement in this direction. The difficulties of getting crude vegetable drugs have also decreased during recent years. Progress, I believe, has been made in connection with the high railway freight for transportation of raw material and medicines manufactured in India. The greatest difficulty of the honest manufacturer is competition with dealers who import cheap drugs of low standard and with small manufacturers in this country, who purposely turn out inferior products. Legislation, in the form of a Drug Control Bill which will be enacted in the near future, will, I have no doubt, put an end to this state of affairs. The drug industry in India stands on very much firmer ground and under more favourable conditions than even a decade ago. The manufacturers of drugs are, therefore, now in a very much better position to cope with the conditions which have

been created by the present war than they were in 1914 and during the period of the last war.

#### PRESENT STATE OF DRUG INDUSTRY

Let us now examine what is the position with regard to the manufacture of medicinal preparations at the present time in India. Although no reliable statistics are available, from the knowledge I have of the drug industry in India, I have reason to believe that medicinal drugs manufactured in this country may at the present time be estimated at not less than 30 to 40 per cent of those imported, i.e., of the total figure Rs. 2,59,34,000 of imports, as shown by the seaborne-trade returns of British India during 1936-37. There are probably less than a dozen of the larger firms of drug manufacturers in this country who turn out medicinal prepara-tions on a large scale. Most of them manufacture medicinal drugs, pharmacopæial and otherwise, proprietary preparations, and toilet products, in many cases from basic material largely imported from abroad. So far as basic chemicals are concerned, the produce at present is mainly confined to small quantities of acids and a few of the common chemicals. Attempts are, however, being made to improve this state of affairs and to start the manufacture of heavy chemicals, such as alkalies, acids, chlorine products, etc., in India, but as far as I know these schemes have not fully matured, therefore at present we have to depend on imports from abroad for most of these products. Some Indian firms have lately started the manufacture of patent foods, but much remains to be accomplished before we achieve the standard of many of the imported products. Even such an essential product as glucose has not yet been manufactured in this country.

Besides these large firms, there are a very large number of small firms, some of which manufacture standard products, but many of which turn out preparations which are not above suspicion. Some import products in bulk from concerns of doubtful reputation abroad, bottle them, and sell them to the public. Others obtain concentrated extracts and dilute and label them with their own names before sale. The capital of all the drug manufacturing concerns in India, large and small, put together would not amount to much more than 60 or 70 lacs of rupees. In the absence of any drug control, all these manufacturers appear to be making handsome profits in spite of the fact that many are poorly

equipped and inefficiently staffed.

#### Drug industry in war time

The outbreak of war and the difficulties of getting regular supplies of drugs and essential medicinal chemicals have profoundly affected the drug market in this country. This is natural as India has been and still is largely an importing country in the matter of her supply of drugs. While a large proportion of the drug imports come from the United Kingdom, considerable

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<sup>\*</sup>The résumé of an address at the opening of the All-India Conference of Chemical and Pharmaceutical Manufacturers, on the 6th November, 1939.

quantities of these and certain basic chemicals necessary for drug manufacture came from Germany and other enemy countries. As a great proportion of these have for the time being been cut off, it is important to see how they could be replaced, (1) by manufacture in this country, and (2) where this is not possible by importation from the United Kingdom and neutral countries.

So far as the possibility of manufacture of India's drug requirement in India is concerned, it can now be said with confidence that the indigenous drug industry has progressed considerably; it is now on much firmer ground, and is in a position to supply a large number of the drugs and other medical supplies in common use. It is to be greatly regretted that for many of the essential basic chemicals, solvents and synthetic remedies India is still dependent on supplies from abroad.

A REVIEW OF INDIA'S POSITION WITH REGARD TO DRUG SUPPLY

The drug industry in this country may be classified under five headings:—

I. Manufacture of pharmaceutical preparations, essential oils, fixed oils, etc.

So far as the drugs of vegetable origin are concerned, India is fortunately in a much better position than many other countries of the world. India has a wonderful range of materia medica and nearly three-fourths of the drugs mentioned in the British and other pharmacopæias grow here in a state of nature or have been cultivated. Where the pharmacopæial species do not grow, allied species are available which may be used as substitutes. If our resources are properly husbanded and conserved, India could not only be completely self-supporting in this respect but might also be in a position to supply the rest of the Empire with all the raw products that are needed in the preparations of pharmaceuticals. At present, Great Britain draws a fairly large supply of crude drugs from mid-Europe, particularly from areas which are now under German influence. These will presumably be cut off to a large extent and Indian sources may be of use in meeting such deficiencies as might occur.

Essential oils.—With regard to essential oils, India has the basic materials from which ajowan, caraway, chenopodium, cinnamon, coriander, cardamom, rose, sandal wood, turpentine, etc., can be produced, but others she imported chiefly from central European countries. With the exception of sandal-wood oil, essential oils have not hitherto been distilled in large quantities on proper scientific lines in India, but there is no doubt that this industry could be successfully developed in a very short time.

Fixed oils.—Almost all the fixed oils used in medicine, a.g., almond oil, arachis oil, castor oil, hydnocarpus oil, and oils of linseed and sesame are available in India. Olive oil may be easily

replaced by arachis oil. Purified medicinal castor oil is now imported as cold-drawn oil and is seldom manufactured in India, though the ordinary oil used in hospitals and dispensaries is produced in this country. There would be no difficulty in preparing the purified oil used in medicine in sufficient quantities for the needs of India and the Empire.

# II. Manufacture of alkaloids and other active principles from vegetable drugs

Alkaloids, etc.—Of the alkaloids commonly employed in therapeutics, India can produce atropine and its salts, caffeine and its derivatives, emetine, ephedrine, morphine, codeine, quinine, strychnine, etc. Strychnine is already being manufactured in large quantities and is exported to Australia. Caffeine can be manufactured if tea fluff (dust) is made available to the bona-fide drug manufacturers by the Indian tea industry at a reasonable price. Morphine and its derivatives including codeine are being produced at the Ghazipur opium factory. Large supplies of ephedra and belladonna are available and ephedrine and atropine can be produced in almost any quantity. Some of these industries could not develop during peace time, owing to keen foreign competition and high prices of the solvents which have to be used.

For quinine, both India and the rest of the world will have to depend on the Dutch East Indies for some time to come. India produces a limited quantity of cinchona alkaloids. Between the two plantations at Mungpoo (Sikkim Himalaya) and Neduvattum (Nilgiris), roughly between 65,000 to 70,000 pounds of cinchona alkaloids are produced every year. The total annual expenditure in India at the present time is over 200,000 pounds, so that over 100,000 pounds has to be imported from Dutch East Indies. I have on many occasions urged the extension of Indian plantations, but cinchona plantations take seven to eight years to mature so that for the present emergency India will have to depend on the Dutch East Indies for its supply of cinchona alkaloids.

Ipecacuanha is also being grown in Mungpoo but the supply is small and not commensurate with the demands. This plantation could easily be extended and in the meantime the supplies can be procured from the Federated Malay States, where it grows extremely well. Artenessias grow in Kashmir and in the Kurrum valley, and santonin is manufactured in Kashmir on a large scale and is exported to different parts of the world.

# III. Manufacture of inorganic and organic chemicals used in medicine

Inorganic drugs.—The important inorganic drugs used in medical practice are :—boric acid, hypophosphorus acid, salts of ammonium (chloride carbonate), potassium (iodide, bromide, chlorate, permanganate),

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bicarbonate, iodide, phosphate, (bromide, magnesium (carbonate, and salicylate) For almost all of these, oxide, sulphate). India depends on foreign supplies at the present time. Apart from alkalies and acids, the most important items required are iodine and bromine. So far as iodine is concerned there is the possibility of securing it from Japan. If Great Britain revives the Scottish Kelp Industry during the war, there is also the possibility of getting at least a partial supply from this source. Bromine will be more difficult and special measures will have to be devised to secure it. Some of the above-named inorganic drugs are already being manufactured in India, but their manufacture entirely depends upon the supply of certain essential basic chemicals and solvents from abroad. Every effort should be made to encourage the production of these basic materials in India.

Special organic drugs.—Practically without exception all of the special organic drugs have to be imported at present. The chief source of many of these, such as acetone and acetic acid, acetylsalicylic acid, benzol and benzoic acid, citric and lactic, oleic, tartaric and trichloracetic acids, ether, ethyl chloride, chloral hydrate, chloroform, hexamine, glycerine, amyl nitrate, urea and lactose, was Germany, though some were also obtained from the United Kingdom and the United States of America. Many of these have been or can be manufactured under emergency conditions in India, provided basic chemicals and solvents are available.

Metals and organo-metallic compounds.—For preparations like gold salts, silver compounds, inorganic preparations of mercury (mercurous and mercuric chloride, mercuric iodide), inorganic arsenicals (arsenic tri-iodide and tri-oxide), inorganic bismuth compounds (bismuth carbonate and salicylate) and lead compounds (lead subacetate), India is entirely dependent on foreign supplies at the present time. Many of these compounds could easily be manufactured. Copper salts (sulphate) can be prepared from Indian copper, while zinc, antimony and lead can be obtained from Burma.

The organo-metallic compounds of gold (solganol, sanocrysin, etc.), silver (argyrol, protargol, etc.), mercury (novasurol, salyrgan, mercurochrome, etc.), arsenic (neoarsphenamine, sulpharsphenamin, stovarsol, carbarsone, tryparsamide, etc.), antimony (ureastibamine group, neostibosan group, stibamine glucoside, etc.) are mostly imported at present. Organic compounds of arsenic, antimony and bismuth have been successfully prepared in India, and if research is properly organized most of these compounds could be prepared in this country. Reserve stocks held in India may be sufficient for the needs of the immediate future, but, in the case of a prolonged war, supplies for the popula-tion of the country should be ensured and this can only be done by encouraging local manufacIV. Manufacture of biological products including sera, vaccines, gland products, etc., vitamins and food preparations

Glandular products including liver extracts.— There should not be any great difficulty for the supply of these products from the U.S. A. but many of these can be manufactured in India provided the slaughter-houses are run properly and the dissection and separation of fresh glands are done under expert supervision. The question of solvents is also of prime importance in this connection. One or two of the manufacturing houses in Calcutta have produced thyroid, adrenal and posterior pituitary preparations. Some of these have been tested in the Biochemical Standardization Laboratory and have given satisfactory results. There is little doubt, however, that quite a large proportion of India's requirements in these glandular preparations and of products such as testicular and ovarian preparations, insulin, corpus luteum preparations, etc., are at present obtained from abroad. Within the last few years, sex gland preparations are being produced synthetically and are in large demand. Their therapeutic uses are still largely experimental and even if they are cut off, not much difficulty is likely to be experienced. Liver extracts both for oral use and injectable forms can be, and actually are being, prepared in India.

Vitamin preparations, patent foods and irradiated milk foods and cereal products.—Vitamin preparations have now established themselves in therapeutics and are being prescribed by a large number of practitioners. Pure vitamin preparations which are largely of synthetic origin are imported and will be difficult to get during war time. The want of these preparations can be largely met by giving natural vitamin-rich foods in suitable quantities.

Cod-liver oil is an important imported product and will probably be difficult to obtain. I have no doubt that it can be replaced by fishliver oils of India, some of which have a high vitamin content, if a little more research is

carried out in this direction.

Some patent foods and irradiated milk foods are important accessories to medical treatment. These are all imported but fortunately a large quantity, of these are obtained from Great Britain and, therefore, at least a partial supply will be possible.

Biological products.—Prophylactic and curative sera of all types are being manufactured in India. If the quality of these is controlled by proper standardization, this source could easily be developed to meet all the Indian demands. For this International Standards (toxins, antigens, antitoxins, etc.) have to be regularly supplied to the manufacturers.

V. Surgical dressings, disinfecting fluids, etc. Absorbent cotton, gauze, jute, lint, bandages, etc., are being manufactured in India and no difficulty need be apprehended.

Disinfecting fluids of the type of phenol, cresol, etc., are being prepared in very small quantities from coal-tar distillation, but their manufacture could be extended.

REQUIREMENT OF DRUG MANUFACTURERS AND DIFFICULTIES IN PROCURING SUPPLIES

I may here briefly refer to some of the difficulties of the manufacturers in connection with obtaining supplies of materials used in the manufacture of medicinal preparations under the conditions which have arisen on account of

A critical analysis of the situation convinces me that the chief difficulty lies in the fact that India does not at present possess facilities for producing certain essential basic materials, such for example as alkalies, acids, solvents, phenol, aniline, iodine, bromine, urea, etc., which may he said to constitute the keystone of the drug manufacturing industry. In the case of some of these, the country lacks the natural resources of these materials, but in most cases their production is dependent on the other associated industries which are non-existent in India at present. I may here give a few examples :-

(a) Mineral acids.—Sulphuric acid is the key substance used in the production of many pharmaceutical preparations, as besides being used in the manufacture of alum, sulphates of magnesium, sodium, ammonium, iron, etc., it has other important applications. Its manufacture is at present entirely dependent on the supply of sulphur which is derived from Japan, Italy and America. The consignments from the two former countries have recently ceased, and difficulty has been experienced by some firms in obtaining sulphur. Supplies are, however, maintained from America and no serious shortage need be apprehended. The chief source of sulphur in this country is from iron and copper pyrites of which large supplies are available in Behar and some are even free from arsenic. Attempts are being made to utilize these in the preparation of sulphuric acid.

If sulphuric acid can be produced other mineral acids can be readily manufactured.

(b) Alkalies, and chlorine and its derivatives. The manufacture of alkalies—soda ash, potash, caustic soda and caustic potash—is poorly developed in India and almost the entire supply is imported from abroad. It is a matter of satisfaction to note that attempts are being made to develop the manufacture of both these groups of important chemicals in India and when this is accomplished a great forward step will be taken in the development of drug and other industries in this country.

(c) Organic acids.—Almost all organic acids are imported at present and are converted into salts used in pharmacy. Citric acid can be produced in limited quantities from limes and lemons and tartaric acid from tamarind, and this was actually done during the last war. It would be possible to produce salicylic acid from

oil of wintergreen (from Gaultheria fragrantis. sima) and benzoic acid from gum benzene.

(d) Solvents.—With the exception of alcohol, practically no solvents are produced on any large scale in this country. This has been attributed to the high excise duty in the case of some of them. Benzol or commercial benzene is in considerable demand, but so far, for various reasons, it has been isolated only by a few firms. This is going to be taken up on a large scale by some of the iron and steel manufacturing firms, but it may take a year or two before the plants are set up and begin to function. Ether is now being produced in India and it should not be difficult to produce petroleum ether which is largely used in the preparation of galenicals and which so far has been imported Chloroform can be manufactured in any quantity if chlorine or bleaching powder is available.

(e) Other substances.—These are but a few examples. Many more of the chemical compounds of arsenic, antimony, bismuth, phosphorus, etc., camphor, urea, aniline, which are mostly imported at present and which could be manufactured in this country, could be cited.

I am convinced that all the different departments of the Government of India are very willing to help everyone concerned in solving the difficulties which have arisen and which are likely to arise on account of the present situation. All they need is a representative organization of the different interests concerned with the manufacture, import and sale of drugs and which would be authorized to deal with the supply department in connection with any difficulties that might arise. This is what is wanted and it is the obvious duty of an Association such as this to help in setting up an organization which will not only deal with the Government, but will take up the question of drug manufacture in India on proper scientific and business lines. I said in the beginning that the root cause of trade in spurious and low-standard drugs in this country is the demand by the people for drugs which they can afford to pay for.

## Medical News

THE NEED FOR CO-OPERATION IN THE WITH SPECIAL REFERENCE TO MATERNITY MEDICAL HEALTH SERVICES AND CHILD WELFARE

(An address by Major-General G. G. Jolly to the Delhi Maternature Committee) DELHI MATERNITY SERVICES CO-ORDINATION COMMITTED

The development and expansion of the spirit of co-operation is one of the greatest needs of our racial Divisions between man and man, whether along racial national, religious, linguistic or other lines, most which have existed for ages, seem to have become prominent in recent years and to obtrude themselves when prominent in recent years and to obtrude themselves when any serious attempt in the control of the province human and the control of the cont when any serious attempt is made to improve human relations on a co-provided in made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on a co-provided in the made to improve human relations on the made to improve human relations of the made to improve human relations on the made to improve human relations of the made to improve human relations on the made to improve human relations of the made to improve human

And yet, paradoxically enough, a genuine desire of co-operation and a realization of the need for it also

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seems to be more widespread than ever before.
Perhaps it is that with the spirit of co-operation
abroad the obstacles real and imaginary stand out more
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dearly in contrast and the forces of reaction tend to be mobilized in opposition.

The medical profession has not remained immune from the general tendencies. In England the formation of the Ministry of Health after the last war was a contract of the medical piece of reorganization. much needed piece of reorganization, co-ordinating under one central direction a series of separate health under one central direction a service of separate nearth services each of which formerly served a section of the population. A Ministry of Reconstruction pamphlet of 1919 states: 'In the absence of a Ministry of Health the departments concerned with each special section retained and developed their own responsibility by means of independent and watertight machinery, while as every such section of the population overlaps to some degree every other section, the specialized health provision thus established rapidly became full of duplication and overlapping. In England now the lack of co-operation is not so much between different sections of the official health services as between these official health services and the great body of private practitioners. Possibly the eventual solution may be the formation of a complete medical service for the nation, which in effect would make all practising medical men officials of the State.

Here in India lack of co-operation between official and non-official doctors has not yet made itself very apparent outside the towns because, so far, few private practitioners have settled in the rural areas. has, however, to be guarded against is a tendency to overlapping and lack of co-ordination within the Government Medical Services. This would be most unfortunate. We are all members of one great profession serving the public, we have a common objective—the health of the people—and, within our geographical boundaries, we work side by side under one Government. Most of you will know the old jest about parallel departments of government being those which correspond indefinitely but never meet. It is with the object of giving the lie to that definition in regard to the medical health services of Delhi Province, with particular reference to maternity and child welfere that we meet here this evening.

child welfare, that we meet here this evening.

In order to get the picture clear it is necessary to

look back at our development.

Some thirty or so years ago the Government Medical Services in the provinces of India were split into two, a personal service dealing mainly with the individual and an environmental service concerned primarily with

Some have called these separated departments the curative and the preventive, but this is clearly a misnomer for it is impossible to draw any clear line between prevention. between prevention and cure; moreover the name given to the newly-created service was the 'sanitary department', the term 'sanitary' indicating the environment rather than the person. The officer in charge was known as the sanitary commissioner, on charge was known as the sanitary commissioner, on the analogy of the divisional or financial or excise

At the time of the fission the parent department had its hands full with the ever increasing demand for medical relief and the new department relieved it of environmental hygiene, a subject which was then much more backward even than it is now. So long as the sanitary department kept to environmental hygiene the sanitary department kept to environmental hygiene there was little or no overlapping, more than ample scope existing for the energies of both services, except in time of epidemics when close co-operation was Later, the name senitary commissioner was changed

Later, the name sanitary commissioner was changed to director of public health, an appellation which, welcomed at the time, has had some unfortunate to the erroneous belief that the medical department country or closely concerned with the public health. Mothing of course could be further from the truth, or more damaging to the efficiency of a state medical more damaging to the efficiency of a state medical

department itself or to its relations with the public. One of the most important sections of the English Ministry of Health is that dealing with hospitals and the term 'public health' in England and in every other country, that I know is interpreted to include hospitals. country that I know is interpreted to include hospitals and all other forms of medical relief.

Similarly, with the term 'health services'. The Political and Economic Planning Committee in their classic report on the British Health Services say: 'One of the first difficulties which arose was to find a satisfactory answer to the question—What are the health services? To take a narrow definition would have been to perpetuate the common mistake of using "health of the common mistake of using the common to perpetuate the common mistake of using "health services" as a synonym for "sickness services". On the other hand, the subject would be expanded to an unmanageable extent if we were to follow to its logical end the view that health services cover all human activities which promote or might be used to promote health, including for example labour management, the design and pricing of food and clothing, housing and its location in relation to work and play, and the methods of using leisure. We have tried to strike a balance between these two views, on the one hand examining the importance of improving the services which deal with actual cases of ill health, and on the other emphasizing the need for a progressive widening of the idea of health services to bring in and co-ordinate many activities at present carried on without relation to, or actually in opposition to, the needs of national health'.

In England and elsewhere we have a unified system of control of the medical health services, in most provinces of India we have arbitrarily split the service and to some extent the profession into two sections. In England we have a medical officer of health, in India a medical officer and a health officer.

In a number of provinces people are beginning to ask why there are two medical services dealing with the one subject of health, what their separate functions and limitations are, what logical basis exists for these, why the system in India differs from that in other countries, and particularly why we have a unified system in some provinces and separate departments in others' These questions are not easy to reply to. The answer I usually give is that so long as co-operation is close and cordial the separate system works well but that, if co-operation fails and overlapping of function and duplication of staff appear, the remedy is unification

of control.

There are many branches of public health workand I use the term in its correct wide sense-in which the need for close co-operation between what I might call the clinical and the field staff is obvious. Examples are school medical work, tuberculosis, and leprosy. Perhaps still more striking is the subject which has inspired the formation of the Delhi Maternity Services. Co-ordination Committee.

At its last meeting the Central Advisory Board of Health—itself a body designed to promote co-operation -passed this resolution-

Co-ordination between the medical and public health departments is perhaps more vital in the field of maternity and child welfare than in any other sphere of medical and public health work'

It is sometimes argued that child-bearing is a normal physiological process of the body, automatic, self-regulating and entirely remote from disease. Ideally this may be so, but without the doctor and the nurse the process.

this may be so, but without the doctor and the nurse the process is associated with a maternal mortality in the neighbourhood of 25 per 1,000, and an infantile mortality which in India may be as high as 35 per cent. Each stage pre-natal, natal and post-natal may with luck be safely negotiated without the aid of doctor or nurse, but it is a proved fact that that mother stands the best chance of safe delivery and a healthy child who obtains and follows expert medical advice throughout. Much responsibility can and in most cases must be devolved upon health visitors and midwives, but our efforts should be directed towards securing the minimum necessary examination and supervision by a qualified doctor in every case. A tendency, of

which I have seen evidence in this country, to short-circuit the doctor and rely entirely upon the judgment and skill of a health visitor or midwife requires to be countered and both the doctor on the one hand and the health visitor or midwife on the other should realize that each is complementary and therefore helpful to the other.

have seen maternity and child-welfare centres located within hospital compounds and others a mile or more away. I don't think this is a matter on which a rule can be made; much will depend upon local circumstances. What is important is that no centre should try to work independently of a practising doctor and that no such doctor should think he can efficiently do his share of the work without attending regularly at the centre.

Pre-natal and post-natal clinics should be held by the doctor on regular days at the centre itself, cases requiring treatment at the hospital being given attendance or admission cards, and whenever possible being taken there by the health visitor. This I regard as important since it is just as desirable for the health visitor to attend and have a recognized status at the hospital as for the doctor to attend and have his recognized status at the centre.

The weak link in the chain at present is the connection between centre and hospital. It is here that misunderstandings occur and patients get discouraged

Where several centres are linked with one hospital definite arrangements require to be made as to the day or days in the week for sending patients for special examination or admission. Any inco-ordination here means delay and disappointment to the patients.

No one I think will question the desirability of having a qualified doctor booked and available on call at every birth, yet I imagine this is far from being realized in Delhi. I shall be interested to hear the views of those with local knowledge on the position in regard to this. The private prestitioner must not in regard to this. The private practitioner must not be forgotten. There is perhaps a danger that in the natural desire to complete the official service the rôle of the private practitioner may be overlooked. if the medical profession are not to see obstetrics pass from their hands to the midwives it is essential that they undertake to attend cases of child birth, not only in those hospitals and maternity homes to which they have access but also in the houses of the people, and much of this work among the poorer classes must of necessity be free or subsidized.

If the centre is dependent upon the hospital, the hospital also needs to rely on the centre. In the case of patients coming direct to hospital, the doctor, if he knows and appreciates the help the centre can give, will be only too ready to avail himself of it and to put his patient in immediate touch with the nearest It is remarkable however how little practising medical men, both official and non-official, know of the activities of health centres.

I have been impressed by the abuse of free hospital facilities on the part of those able to pay, that is occurring in various parts of India. In a country where medical relief is in any case grossly inadequate medical treatment given free at public hospitals and dispensaries to those able to pay, pauperizes the public, pauperizes the medical profession and accommodates the rich at the expense of the poor. In maternity and child-welfare work, as in other branches of our medical activities, it is necessary to guard against this abuse which is an encroachment upon the domain of the registered medical practitioner that, if permitted to develop, will lead to a lack of co-operation between the official and non-official members of our profession.

In regard to child-welfare work I feel that an equal or even closer association between hospital and centre, doctor and health visitor is called for. Each is an essential partner in the work and each must contribute his or her share for the benefit of all. Only in this way can misunderstanding and mistrust be removed from patients and staff alike and replaced by a genuine spirit of co-operation.

For the working out of the details of a provincial For the working out of maternity and child welfare scheme of co-operation in maternity and child welfare a small ad hoc committee may be of value which should also meet periodically to consider the progress

Other points occur to me, but as I have already Other points occur to his, but all already taken up so much time I shall only mention them briefly.

There is the use of centre dais for private cases, a question regarding which there are likely to be two views based on the danger of neglecting the indigent well-to-do classes on the other.

There is the question of how far centres should participate in medical treatment which is the same question of co-operation again, and lastly the important matter of utilizing the centres and their valuable contacts with the people in the training of medical students and nurses

On all these points frank discussion to elicit the different points of view will be of value.

I am a fervent advocate of close co-operation in the medical health services of the country and between these and the great body of private practitioners was not always so ardent an advocate of co-ordination but experience gained in my service which has been both of curative and preventive work and in both the individual and community spheres of public health have I think given me a measure of binocular vision. and the picture I see more and more clearly as time goes on is that of one medical department of health co-ordinating and applying all technical knowledge and skill to the common goal of the maintenance and improvement of the health of the people.

#### ANNOUNCEMENT OF THE FRANCIS AMORY SEPTENNIAL PRIZE OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES UNDER THE WILL OF FRANCIS AMORY

In compliance with the provisions of the Will of the late Francis Amory, the American Academy of Arts and Sciences, as Trustee of a fund given by the testator, announces a prize to be known as 'The Francis Amory Septennial Prize' to be awarded for conspicuously septences. meritorious work performed during the immediately preceding septennial period, 'through experiment, study or otherwise, in the treatment and cure of diseases and decreases at the treatment and cure of diseases. and derangement of the human sexual generative organs in general, and more especially for the cure, prevention or relief of the retention of urine, cystitis, prostatitis, etc.' While the donor wished especially to reward the discovery of any new method of treatment, he expressly authorized that the prize might be given to any author who might have contributed any theoretical or practical treatment. treatise of extraordinary or exceptional value and merit on the anatomy of the said organs or the treatment of

If there shall appear work of a quality to warrant it, the first award will be made in 1940. The total amount will exceed \$10,000 which may be divided at the discretion of the Academy among several nominees. While formal nominations are not expected and no essays of formal nominations are not expected and no essays of treatises in direct competition for the prize are desired, the Committee invites suggestions looking toward the wise performance of their duty. Communications this subject should reach the Committee not later than 15th May, 1940, and should be addressed in care of the this subject should reach the Committee not later that 15th May, 1940, and should be addressed in care of the American Academy of Arts and Sciences, 28, Newhork Street, Boston, Mass., U. S. A. The members of the Committee on the Francis Amory Septennial Prize are Dr. Roger I. Lee, Chairman; Dr. Walter B. Cannot Dr. David Cheever, Prof. Leigh Hoadley, Dr. William C. Quinby, Dr. E. E. Tyzzer and Dr. Soma Weiss Secretary.

# HEAVY DEMAND FOR CHOLERA VACCINE

During the year 1938, the demand for cholera vaccine manufactured by the Central Research Institute Kasauli, beat all the previous records since 1927.

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epidemic conditions were chiefly responsible for the demand which was very heavy during the months from demand which was very heavy during the months from demand which was very heavy during the months from the Argin to August. To cope with it, the staff at the April to had to work even on Sundays and other institute had to work even on Sundays and other institute The Punjab and North-West Frontier Province and the contiguous Indian States and the Army were the main clients. The supplies also went to Afghanistan and Egypt.

to Afghanistan and Egypt.

The total issues of the prophylactic cholera vaccine approximated 2,000,000 c.cm. Of this 1,984,486 c.cm. were issued to indentors in India and 10,120 c.cm. to foreign countries in the Near East. The issues-of the year 1938 were eight times as high as in the previous

The following figures show the issues over a period of six years:—

1933 . 462,002 c.c. 1936 . 731,700 c.c. 1934 . 601,590 c.c. 1937 . 241,458 c.c. 1935 . 1,836,820 c.c. 1938 . 1,994,606 c.c.

The manufacture of vaccines and sera continued on a large scale; and issues were heavy during the year. Prophylactic cholera vaccine and TAB vaccine were manufactured on the largest scale. The preparation and issue of anti-venom serum continued as in the previous year, with the difference that it also captured other markets such as Portuguese India and the Philippine Islands, in addition to the previous ones—Burma, Ceylon and Iran.

The Army in India remains one of the best buyers of the sera and vaccines of the Institute.

GONADOTROPIC AND LACTOGENIC HOR-MONES. INTERNATIONAL STANDARDS. DISTRIBUTION BY THE BIOCHEMICAL STANDARDIZATION LABORATORY

International standards for (a) the gonadotropic substance of pregnant mares' serum and (b) the

lactogenic (crop-gland-stimulating) substance of the anterior lobe of the pituitary gland (prolactin, galactin, mammotrophin) are now available for distribution at the Biochemical Standardization Laboratory, Calcutta. They have been prepared in accordance with the recommendations of the Third International Conference on the Standardization of Hormones, held at Geneva in August 1938.

The Biochemical Standardization Laboratory, which has been appointed by the Government of India as a 'National Centre' for the distribution of standard preparations of biological products, holds these standards on behalf of the League of Nations and sends them on request free of charge to any bona-fide research institution or commercial organization. The laboratory also gives all relevant information regarding the standards to those who are interested in their use.

THE GRAND PRIORY IN THE BRITISH REALM OF THE VENERABLE ORDER OF THE HOS-PITAL OF ST. JOHN OF JERUSALEM

The King has been graciously pleased to sanction the following promotions in, and appointments to, the Venerable Order of the Hospital of St. John of Jerusalem.

As Officers (Brothers)

Colonel (now Major-General) Gordon Gray Jolly, C.I.E., I.M.S.

Colonel Reginald Stephen Townsend, I.M.S.
Lieutenant-Colonel Alured Charles Lowther O'Shee
Bilderbeck, M.R.C.S., L.R.C.P., D.P.H., I.M.S.

As Serving Brother

Lieutenant-Colonel Jordan Constantine John, o.B.E., M.B., M.R.C.S., I.M.S.

# Current Topics

## General Therapy of Pneumonia

By ROGER I. LEE, M.D.

(Abstracted from the Journal of the American Medical Association, 7th October, 1939, p. 1411)

Ar this date, May 1939, it is certainly premature to discard all other therapeutic devices and measures in pneumonia, and in all likelihood it will always be foolhardy to treat the disease pneumonia or any one of its symptoms exclusively and to ignore the patient. In truth the patient is the container of the disease. He then becomes the battleground of what formerly nearly As the opposing forces line up and get into action and patient or container of this devilish battleground is turnoil the patient has functional obligations, including Moreover, according to our present beliefs the patient the invading enemy if cure is to result, no matter how Essentials.

specific drugs and serums seem.

Essentially the general management of a case of Rest and quiet are the prime considerations. There includes the suspects, to bed. Within the first twenty-undue increase of risk in an ambulance (not an auto-over a few miles and provided the bed to bed journey

is accomplished with the smoothest possible arrangements. However, any move does actually increase the risk somewhat and after forty-eight hours of the disease the increase in risk to the patient is considerable. Therein often is required a wise balancing of benefits and hazards with the prejudice toward non-transportation after forty-eight hours.

In the home the so-called hospital regimen must be established, including a hospital bed and continuous nursing. By rest I mean the elimination of any unnecessary physical activity. The patient should not feed himself or give himself a drink. He should not turn over by himself. By quiet I mean the elimination of any unnecessary outside disturbance to the patient. This obviously includes visitors and also includes any unnecessary medical manipulations and examinations. Blood counts, blood cultures, physical examinations and x-ray examinations must be carefully organized in advance and carried out with precision and dispatch. Likewise the somewhat elaborate and technical procedures as intravenous serum therapy or intravenous fluid therapy or subcutaneous medication or fluid administration should be prepared as far as possible outside the room.

outside the room.

Probably next in importance is the supply of an adequate amount of fluid to the patient. On this subject there is a wide diversity of opinion. My own view is that the intake should suffice to keep the urinary output in the neighbourhood of 50 ounces (3 pints, or 1,500 c.c.). Less than this I regard as insufficient and much more than this as creating unnecessary work for the heart, circulation and kidneys. Some patients who sweat a good deal may have difficulty in getting in an adequate amount of fluid.

Other patients may have marked gastric disturbances in the early days of the disease. Perhaps a majority of patients who take sulphapyridine have gastric symptoms to a greater or less degree. Some of these patients will require fluid by some other route, although skilful nursing with a shrewd selection of fluid e.g., the use of very weak, rather hot plain tea, and the avoidance of egg-nogs and of excessive fruit juices will diminish the number of patients who must be disturbed either by intravenous or by subcutaneous fluids. If there is vomiting and acidosis one may lean toward intravenous saline solution with dextrose, but my personal preference based on physiological grounds is for the subcutaneous route. The desirability of avoiding intestinal disturbance, either distention or diarrhoea, both of which are well-known bugaboos in pneumonia, usually decides against using the intestinal

In the average case of pneumonia in the acute stage, little attention need be paid to the caloric requirements. It is imperative to get in fluid and highly desirable to avoid distention or diarrhoa. Hence a low residue diet without much milk meets the requirements. Obviously food requiring chewing should be avoided, but minced chicken, mashed potato, soft toast, soft cereals, eggs, ice cream and apple sauce indicate the range of possibilities. With distention milk may be further reduced and cream added. Usually a mild vegetable laxative is given each night and an enema if necessary every other day.

The evidence is clear and strong that sodium chloride is diminished during pneumonia, through perspiration and in the pulmonary exudate. Therefore the salt in the diet is increased and frequently, if capsules are well tolerated, salt is so given in 5 or 10 grain (0.3 or 0.65 gm.) capsules up to 60 grains (4 gm.) a day.

While there is some evidence that ascorbic acid and probably some of the other vitamins are diminished in pneumonia, at this time and for this discussion it seems better to consider vitamin and iron therapy in management of the convalescence and not of the

Over the years the old saying has been repeated The disease is in the lungs but the danger is in the heart'. Translated into the terminology of to-day and without attempting a precise explanation of the complicated pathologic physiology, one may say simply that the danger lies in circulatory failure. After a very thorough trial the evidence is definitely against the value of routine digitalis therapy in pneumonia. In a previously undamaged heart and circulation, digitalis and its group are but rarely indicated. The indications for the exhibition of digitalis are the usual indications of an incompetent heart. The heart is seemingly stimulated early in the disease by the circulating toxins or the fever or both. Later in the disease those patients who seem likely candidates for cardiac incompetence age may be benefited by digitalis. A not uncommon cardiac symptom in patients beyond middle age and rarely before is the occurrence of a tachycardia, paroxysmal in type, of the nature of flutter or fibrillation. Such attacks usually cease spontaneously, but quinidine or digitalis or both are ordinarily indicated. from previous cardiac damage, hypertension or old

There may be, of course, in pneumonia a wide variety of incidental symptoms. Many patients have a previous familiarity with various members of the salicylate group. If sweating is not greatly increased and if the stomach is not disturbed, some comfort, ease of headache and of general malaise and diminution of fever may be attained by the moderate use of the salicylate group. The pleuritic pain, usually early, may be distressing. A swathe is better than drugs. The salicylates may of course be tried. The exhibition of large doses of opiates has been regarded as contraindicated in pneumonia and with a good deal of supporting physiological evidence. On the other hand the desideratum of rest is so important that I feel no hesitation in using frequent small doses of morphine subcutaneously. By small doses I mean as small as 1/32 or 1/16 grain (0.002 or 0.004 gm.). This is also very useful in combating restlessness. The oral administration of morphine, codeine and opium has the

objection of being dicidedly consequences.

Fortunate indeed is the patient with pneumonia whose restlessness is controlled by one-fourth grain grain grain whose restlessness is controlled by one-fourth grain whose restlessness is controlled by one-fourth grain (0.016 gm.) of phenobarbital a few times a day and who sleeps soundly with phenobarbital or pentobarbital who sleeps soundly with phenobarbital or pentobarbital and reluctant to the controlled the state of the controlled the state of the controlled the state of the controlled the co or some similar drug. I myself am reluctant to use any further medications than those I have mentioned but there are always exceptions.

As far as I know the only usefulness of alcohol is if in small and nondisturbing doses, it creates a beneficial mild euphoria. Alcohol does not seem to me to have any important place in pneumonia therapy,

I mention diathermy and pulmonary collapse therapy merely to confess inadequate experience with these and similar procedures and to give my impression that at this time they do not seem to occupy a place in the management of pneumonia.

Time does not permit a discussion of the various complications and sequelæ of pneumonia. Furthermore until further experience and data have been gained with the newer and more effective therapeutic agents. serums and chemicals, alone or in combination, physicians are in no position to discuss the management of

these conditions intelligently.

The general treatment of the pneumonia patient as I have outlined it seems highly innocuous in contrast to the era in which bleeding, purging and puking were almost routine. Likewise physicians have given up cupping, counter-irritation and poultices. They no longer subject their patients (and the nurses) to the icy blasts of winter. However there may be merit in the air-conditioned room in summer and perhaps in a room where the temperature can be controlled.

Even if slush baths are not used for reduction of temperature, certain forms of bathing which have sedative effect are regarded highly. That and the judicious employment of rubbing or of massage are accepted as a part of good nursing care.

In effect, an attempt is made to manage the patient so as to conserve his strength, so that he may be fortified against the devastating tumult of the battle within him and that he may contribute what he can to the suppression of the enemy pneumonia. Pneumonia is always to be regarded as one of the doctor's most common major emergencies. Loss of time may mean loss of life. During the few days of emergency, no detail is trifling. And while the glory of a victorious battle will go to the big guns of chemotherapy, serum therapy and oxygen therapy, this battle, like other battles, is often actually won by the nonspectacular infantry, in this case, the general care of the patient.

#### Painful Eyes

By R. F. MORE, F.R.C.S. (From the Medical Press and Circular, Vol. CCII, 11th October, 1939, p. 304)

In dealing with the question of painful eyes it will

be convenient to consider them in two classes. In one group we shall have cases where there is some disease or lesion of the eye itself which is responsible for the pain such as with a other will be for the pain, such as iritis, and in the other will be included those numerous and in the other will be the pain, such as iritis, and in the other will be included those numerous cases variously described of the patient as discomfort, aching, smarting, pain even severe pain in eyes which themselves are entired free of any discoverable abnormality.

I have often thought, it would be instructive if the content of the conten

I have often thought it would be instructive if on a measure of body had a measure of pain in the way that we have of both temperature, for no one will doubt that what one person will refer to as disconfert mother will describe

person will refer to as discomfort another will describe as pain, or perhaps even excruciating pain.

Pain in the eye can be very severe, especially in the where the intraocular tension is raised, and I think it as feature of eye pain that if it is at all severe periods and the patient is not accorded those periods of revision. persistent, and the patient is not accorded those period of remission or temporary relief which are granted most other sufference from relief which are granted to most other sufferers from pains in other parts.

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It may at the outset be accepted as an axiom that It may at an entering the pain is complained of in an eye which is entirely if pain is complained of in an eye which is entirely free of redness, such pain is not an indication of organic disease, and to this I know of one only seeming disease, to which I shall refer

exception, to which I shall refer. Let us first say something of pain referred to the eye

but which has some distant cause. I suppose it is true but which has some distance that I suppose it is true to say that the eye is the most sensitive organ in the body and consequently if an individual is out of sorts below the approximate find that the eye acts it is not surprising to find that the eye acts as a sort of indicator of the general ill or well being. Folk who, without being ill, are in poor condition, will complain that on awakening in the morning their eyes smart and feel dry, and it is some time before they are made comfortable by blinking. I think of this as being due to their eyes having remained still during the night hours and so there has been a minimum of tears from

the absence of eye movement. A large number of patients who consult an ophthalmic surgeon do so because their eyes ache; they ache when reading or sewing perhaps, and in many instances the symptoms are caused by errors of refraction, and some by muscle imbalance. There is no doubt that these two imperfections when uncorrected are responsible for a great deal of discomfort estimated in the consciousness of some as actual pain. But apart from any such errors one is often told that the eyes ache when motoring, or in cinema or theatre or when something is looked at fixedly for a short time, or indeed without any known reason. One finds it difficult to allocate a cause of these. For motoring I have thought perhaps the constant attention on the road and the constant movement of the eyes might explain it, that in fact it had a muscular origin. For cinemas and the theatre perhaps the flicker of the pictures and the unusual and rapid change of scene of the latter, and perhaps the lack of ventilation in both.

There is a painful condition, which affects one eye only, which is usually described as a burning feeling. I have heard it said it was as if a drop of mustard oil I have meated it said it was as it a drop of interest in had been dropped into the eye; it continues for years. I have watched one such case for more than twenty years. The pain during that time has fluctuated but has discovered for the said of t has disappeared for short periods only, and has been sufficient considerably to curtail the individual's reading capacity. The removal of teeth has not altered it and now at the end of more than twenty years the functions of the eye are unimpaired and it is free from all signs of disease. I have wondered whether the sinuses could be completely exonerated, but have been reduced to thinking of it as neuralgia.

The involvement of the trigeminal nerve in a neoplasm or in inflammation may cause pain referred

to the eye, and later neuropathic keratitis may develop. May we now give attention to those cases where the pain is clearly due to a pathological change in the eye itself, and in distinction to the former group, the pain in this pain in this group is accompanied by a varying degree of redness of the eye, and usually by ptosis and lachrynation

The characteristic description of the pain of conjunctival or corneal disease is of a gritty feeling, as if the eye was filed. eye was filled with sand, or as if something were in it. It may be that a foreign body is present either in the cornea or under the lid, the latter is much the more uncomfortable for with every movement it scrapes over uncomfortable for with every movement it scrapes over the highly sensitive cornea. A corneal ulcer or abrasion may be present. Iritis is a cause of what there is a variety which is usually called 'quiet iritis', in which there seems to be no room and in which all in which there seems to be no pain, and in which all the signs of acute disease are slight.

The pain of acute critis is often compared with severe toothache. It is felt deep in the eye, along the side of the nose or in the malar bone.

The pain of cyclitis, interstitial keratitis, and scleritis in general similar to that of iritis, but is less severe; at of scleritis that of scleritis is often worse at night.

In herpes zoster of the ophthalmic division of the fifth nerve the eye itself usually becomes involved if the nasal branch of the nerve is affected; the cornea, iris and ciliary body are involved and the eye remains inflamed and painful for many months.

Particular mention should be made of the pain of an attack of acute glaucoma for it is especially severe and indeed so severe as often to cause nausea or vomiting, and as a consequence of this it is no uncommon thing to find the eye condition almost ignored and a diagnosis of some acute abdominal condition made. The resulting delay in the treatment of the eye has many times led to a quite unnecessary and irreparable blindness.

Retrobulbar neuritis.-By this title is embraced any involvement of the optic nerve posterior to the globe, and whilst the term would seem necessarily to indicate and winist the term would seem necessarily to indicate an inflammation of the nerve, it is generally used in a comprehensive way to include any cause which affects the nerve, though its nature may not be clearly inflammatory.

One of the special features of retrobulbar neuritis is a deep-seated pain which is made worse by moving the eye or on pressing it backwards into the orbit. It is the outstanding example of organic disease in which no sign of inflammation of the eye is present. It is, however, an involvement of the nerve behind the globe rather than of the eye itself.

By a long way the most important cause of acute retrobulbar neuritis is disseminated sclerosis, and indeed it may be said that acute retrobulbar neuritis occurring in young adults up to middle age is disseminated sclerosis, if diabetes and obvious exogenous poisons, e.g., methyl alcohol, can be excluded, and this is true even though at the time no other discoverable evidence of the pervous disease no other discoverable evidence of the nervous disease is present and may not develop, as I have seen, for twenty or more years.

Inflammation of the sphenoidal sinus is believed by some to be a source of retrobulbar neuritis and it has been stated that it is this cause that produces pain on movement of the eyes, and that the pain on movement is indeed characteristic of this cause.

That the retrobulbar neuritis of disseminated sclerosis causes pain on movement I can be sure, and I would go further and say that whilst the close relationship of the optic canal to the sphenoidal sinuses would make it seem likely that inflammation of that sinus might spread to the nerve and cause retrobulbar neuritis, yet in spite of repeated investigations carried out in conjunction with skilled rhinologists, I have never seen a case in which I was in any way satisfied that sphenoidal sinusitis had produced retrobulbar neuritis. In this connection it is important to have the fact in mind that the recovery of sight in the retrobulbar neuritis of disseminated sclerosis is frequently as rapid as the failure, indeed a large measure of recovery may occur-in forty-eight hours. It is clear that unless this is remembered a dramatic restoration of vision may be claimed as a cure for some form of treatment, operative or otherwise, which happens to have been instituted at just the right moment.

One is sometimes asked whether pain in the eye is due to rheumatism, the patient volunteering that he is a rheumatic subject. In the absence of any cause that one has been able to discover, the temptation is present to shield one's ignorance and accept rheumatism as a possible cause, and in this one has at least the support of Jonathan Hutchinson. I can only say that it may be a cause, but where so large a proportion of individuals is ready to attribute certain indefinite pains in any part of the body to rheumatism, and so to believe themselves to be 'rheumaticky', it would be extremely difficult to substantiate that pain in the eye was not due to the same uncertain cause.

Lastly may we consider what measures are available for relief of pain in the eye. I mean local applications; for the general relief of pain by narcotic drugs need not come within our scope.

With regard to the pain which accompanies corneal, and to a lesser degree conjunctival lesions, the applica-tion of a pad of wool bandaged on rather, firmly is helpful by restricting the movements of the eye and so limiting the rubbing together of damaged surfaces, and to carry this principle further it is more effective if both eyes are bandaged, for if one eye is left open it is sure to look about and so the other eye moves with it; if there is virulent infection with pus formation it is unwise to bandage it in this way. Some bland lubricant, such as parolein or castor oil, acts helpfully in the same way.

Immediate relief is obtained by means of cocaine, but it has so deleterious an effect upon the corneal epithelium that it should not be used for the purpose we have in mind. Besides, the relief it gives is of

short duration.

In the treatment of corneal ulcers and recurrent corneal abrasions, whilst the application of pure carbolic acid causes smarting pain rising to a maximum in three to four hours, its after effects both as regards pain and permanent healing are so beneficial in a case of any severity that it is well worth reminding ourselves of its high value.

In intraocular inflammation such as iritis or cyclitis, and where the question of increase of tension does not and where the question of increase of tension does not arise, atropine is valuable; it is best used in the form of 1 per cent of the alkaloid in soft paraffin. It eliminates all the movements of the iris, and the contraction of the ciliary muscle, and besides breaks down or prevents the formation of adhesions of the

iris to the lens.

Heat applied in various ways is soothing and generally beneficial. It may be applied in the form of hot bathing; the head is held over a bowl of hot boracic lotion in which several swabs of cotton-wool are placed. These are picked up on a wooden spoon or stick and held against the closed lids; when a swab begins to cool a fresh one is applied, the used one being dropped back into the hot lotion. The lotion is kept hot by the addition of boiling water as necessary.

Boracic formentations are comfortable either by

Boracic fomentations are comfortable either by themselves or when alternated with dry heat.

Dry heat is best applied by means of an electric pad, which is kept in position with strapping or a bandage. A thin layer of wool or gauze is placed between the pad and the eye, and a thicker layer outside it in order to conserve the heat. The appliance can with benefit be kept on for many hours a day.

Leeches are really valuable, not only for the relief of pain, but for their beneficial effect in acute iritis, of pain, but for their beneficial effect in acute fritis, cyclitis, or acute or subacute glaucoma. Two or three are applied to the temple. A mixture of equal parts of camphor, thymol, chloral hydrate and chloroform may be gently rubbed on the temple, forehead, or over the mastoid, to give some measure of relief of pain; care must of course be taken that it does not go into the over Tineture of jedine may be painted on the the eye. Tincture of iodine may be painted on the temple and will at least do no harm. A blister, one inch square, applied to the temple will often help in the relief of pain.

#### The Treatment of the Patient with Severe Burns

By R. D. McCLURE, M.D.

(Abstracted from the Journal of the American Medical Association, Vol. CXIII, 11th November, 1939, p. 1808)

TREATMENT OF BURNS-HENRY FORD HOSPITAL METHOD

It is important to bear in mind the necessity of treating the patient as well as the wounds. Treatment naturally resolves itself into three phases: supportive measures, local treatment of the burned areas, and

General supportive measures.—These are largely directed toward the control of symptoms.

1. Pain and restlessness are combated by adequate

and repeated sedation.

Oxygen therapy may be indicated in certain severe

3. External heat is applied: hot water bottles and blankets if the burned area is limited; in extensive burns, the electrically heated cradle tent and superheated room.

4. Restoration of fluid balance is undertaken. The aim of fluid administration should be to obtain a twenty-four hour urinary output of 1,500 c.c. Fluids are given by mouth if tolerated, by rectum, interstitially and intravenously. The continuous intravenous method is often indicated and may be imperative in cases of extensive burns involving the extremities. The solutions used are 5 per cent dextrose and physiologic solution of sodium chloride. aim of fluid administration should

5. Blood plasma transfusions are done. Whole blood 5. Blood plasma transfusions are done. Whole blood should be used only when blood concentration is normal, as indicated by repeated hæmoglobin or hæmatocrit determinations. When hæmoglobin values of more than 15.6 gm. are obtained, plasma transfusions

should be given.

6. Laboratory investigations are made:
(a) Frequent hæmoglobin or hæmatocrit determing. tions should be made.

(b) The urine should be analyzed frequently, with determinations of the specific gravity and albumin content.

Serum protein determination should be made immediately on admission.

When facilities are available, the following procedures should be done:

(d) Chloride estimations should be made at intervals so that depleted chlorides may be restored by intravenous administration of saline solution.

Blood cultures may be taken.

(f) The nonprotein nitrogen should be determined (g) The icterus index should be ascertained as a means of recognizing toxic hepatitis or liver damage.

Local treatment.—1. Remove all clothing under as sterile conditions as possible and place the patient on sterile sheets in a warm room.

2. Take all precautions to avoid infection of the burned area. Treat it just as any other large wound. All dressings and applications must be done under aseptic conditions-masks, gloves and gowns must be worn by doctors and nurses.

3. Débridement should be minimal and should be limited to opening blisters and cutting away dead skin.

4. Tannic acid in a 5 per cent fresh solution is applied with an atomizer or power spray. This is a simple and effective way of tanning the burned area. This solution is sprayed on at frequent intervals until the burned area is thoroughly tanned. Ointment containing tannic acid plus an antiseptic are useful in small burns and for burns of the face and the perineum. The addition of antiseptics such as resorcinol or silver nitrate to the tannic acid with the idea of preventing infantise to the tannic acid with the idea of the tannic acid wit infection has been employed with apparent success, but treating the burned area as a surgical open wound by taking steps to prevent the introduction of infective organisms is an equally, if not more, effective measure.

After-care.—1. Cut away all dead skin and open collections of fluids under aseptic precautions and the again spray tannic acid on the bared areas.

again spray tannic acid on the bared areas. 2. As the heavy tanned crust forms, watch carefully for local signs of infection under the crust and liberale collections of pus. Occasionally the first clue to the collections is evidence of systemic reaction.

3. Prevent contracture deformities by the early use 3. Prevent contracture deformities by the early we extension

of extension apparatus.

4. Employ skin grafting early and freely.

5. Detect and treat secondary anæmia early in the transfusion is the best method of doing this in late stages.

We have continued to advocate the use of tames acid in the local treatment of the skin. Other exchanges the technique have been successful. Other exchanges intrate, have given satisfactory results. The advantage claimed are that the coagulum forms more quality and is thinner and more pliable than that produce a combined tannic acid-silver nitrate treatment. The accellent results believes that the combination is superior to be acid alone, and his experience would tend to be the this contention. He attributes the improvement to the tendence of the contention.

APRIL, 1940]

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increased antiseptic qualities of the mixture and to increased antiseptic quanties of the mixture and to the fact that the coagulum is produced without delay. We have found that the tannic acid may be conveniently applied to the medium of a water-soluble jelly to which has been added an antiseptic of the prevented group. resorcinol group.

#### SUMMARY

The original theory that a toxin is formed in the burned area, from which it is absorbed and carried by the circulation throughout the body, with the production of systemic effects has not yet been settled. In spite of excellent results being obtained in many centres, the death rate in the United States seems to have reached a plateau far above that lower level which is possible with our present knowledge. Disagreements regarding the proper local treatment should not distract our attention from the more important problem—the treatment tion from the more important problem—the treatment of a very sick patient who has a threatening toxemia, alterations in the blood chemistry, a wound very susceptible to infection and pathologic changes in organs remote from the skin. The greatest good can, of course, come through preventing burns from occurring, and I believe that the family physician, through his teaching in the home, can accomplish more than any other agency in this respect. than any other agency in this respect.

#### The Use of Colloidal Calomel Ointment in Dermatology

By T. CORNBLEET, M.D. A. H. SLEPYAN, M.D.

M. H. EBERT, M.D.

(Abstracted from the Journal of the American Medical Association, Vol. CXIII, 11th November, 1939, p. 1804)

Mercury ointments in various forms have long been a standby for the dermatologist. First, metallic mercury ointments were employed, and in recent times the ammoniated mercury ointment has enjoyed tremendous vogue. In the last few years, calomel ointment has been used in the so-called clean inunction method in the treatment of syphilis.

method in the treatment of syphilis.

Calomel ointment, first prepared in France during the last century, contained 10 per cent of calomel in petrolatum. The British used 20 per cent of calomel in lard. A 30 per cent ointment with white petrolatum was introduced into the National Formulary V (1926) under the name of Ointment of Mild Mercurous Chloride. In N. F. VI (1936) the base was changed to equal parts of white petrolatum and hydrous wool fat. Dr. Lewis C. Britt, chemist of the Oregon State Board of Pharmacy, first pointed out that the N. F. VI ointment gave a narrower inhibitory ring in the agar plate test for antiseptics than did the N. F. V. ointment.

Mr. E. E. Vicher at the University of Illinois College of Pharmacy undertook the study of the ointment. He developed calomel in which the particles were very small, 0.5 micron or less in diameter. This calomel in aqueous suspension with gelatin was incorporated into the ointment base. The new calomel ointment produced an inhibitory ring from three to six times as broad as an inhibitory ring from three to six times as broad as

an important ring from three to six times and did the official calomel ointment.

The improved or 'colloidal' calomel ointment has been extensively investigated from the chemical, bactericidal, pharmacologic and toxicologic standpoints. It appears to be no more toxic and the N. F. ointment, which has never been considered as toxic for ment, which has never been considered as toxic for human beings in doses 1 drachm (4 gm.). It has a prophylactic value in syphilis at least equal to that of the N. F. VI contract

the N. F. VI ointment. As it is not unreasonable to expect that a colloidal calomel application with its demonstrated efficiency as a superior beat and the land of the control of a superior bactericidal agent should find use in certain cutangous disorders, this colloidal calomel ointment has been used in the dispensary of the dermatologic clinics of the Cook County Hospital to a sufficient extent to justify a preliminary report.

#### USE IN IMPETIGO CONTAGIOSA

We have found its greatest therapeutic value to be in impetigo contagiosa. In about 130 cases of this infection colloidal calomel ointment has served as an extremely efficient remedy. The use of ammoniated mercury ointment has long been a standard agent in impetigo, but all experienced dermatologists attest the observation that for some reason this medicament is not as efficient as it was in the past. According to our observations, colloidal calomel ointment clears the eruption in an average of one-third to one-half the time required by ointments of ammoniated mercury. This is particularly gratifying since the colloidal calomel ointment is both cleanly and, so far as our experience goes, not toxic. In not more than three or four instances it has produced a slight irritation, but this was not great enough to necessitate its withdrawal. Its cleanliness is to be emphasized because it gains the patient's co-operation and makes it a favourite over other efficient agents, such as applications of gentian violet solution.

Colloidal calomel ointment was found useful in other superficial pyodermas in addition to impetigo. In ecthyma, the base of the lesion is so deep as to require removal of the overlying crust, whereupon the colloidal calomel ointment proves curative. In Bockhart's impetigo, which is a more superficial infection of the hair follicles than that in furunculosis, and in furunculosis itself, no benefit was obtained from the use of colloidal calomel ointment.

#### ERYTHEMATOUS DERMATITIS BEHIND EAR

There is a condition which produces a superficial erythematous dermatitis in the fold behind the ear which is diagnosed most often as seborrhæic dermatitis and which some authorities think is due to a strepto-coccic infection. This is particularly resistant to treatment and especially so in that form in which the disease process reaches around to the front of the ear. In several cases of this disorder, the use of colloidal calomel ointment has been of benefit. It has been more effective than any other agent we have used.

#### INFECTED LEG ULCERS

Three patients with leg ulcers which, by their appearance, were undoubtedly continued or aggravated by secondary pyogenic infection, received much benefit from applications of colloidal calomel ointment. With no other treatment than the usual advice to the patient to remain off his feet as much as possible, these ulcers healed. In a number of other instances of leg ulcers on a basis of poor circulation, these applications were of no benefit.

#### OTHER DERMATOSES

Several patients with early psoriasis were benefited by applications of colloidal calomel ointment. It must be emphasized that these early cases are as a rule easily improved by ammoniated mercury ointment and that improvement with the calomel ointment represents no great triumph. In older cases of psoriasis and in the inveterate ones, colloidal calomel ointment did not improve the lesions.

Since colloidal calomel ointment proved to be so efficient in some of the superficial infections, it was hoped that it might likewise be beneficial in the superficial fungous infections such as eczematoid ringworm. Unfortunately, colloidal calomel ointment did not influence these infections.

There is a relatively superficial sharply defined.

There is a relatively superficial, sharply defined, exudative, patchy dermatitis that occurs on the backs of the hands and forearms particularly, but which may appear elsewhere also, called infectious eczematoid dermatitis. This probably results from the secondary infection of an already irritated base. Several of these cases were improved by applications of colloidal calomel ointment. Two of them were irritated by this form of treatment, so that it had to be stopped.

A number of other dermatoses were treated with the colloidal calomel ointment more or less unsuccessfully. There is no benefit from its use in lichen planus, paronychia due to yeast infections, pityriasis rosea, tinea circinata, lupus erythematosus or lupus vulgaris.

#### SUMMARY

Colloidal calomel ointment in this study was found to be a clean, unusually effective agent in impetigo contagiosa and related superficial pyodermas. Seborrhœic eczema behind the ears, which is often quite resistant to treatment, was favourably influenced by applications of colloidal calomel ointment. It improved leg ulcers aggravated or continued by a secondary pyogenic infection; also some forms of seborrheic eczema and early cases of psoriasis. In other dermatoses, colloidal calomel ointment either was without benefit or proved to be irritating.

#### Easton's Syrup: An Examination of the Changes occurring during Storage

By W. T. WING

(Abstracted from the Quarterly Journal of Pharmacy and Pharmacology, Vol. XII, July to September, 1939, p. 563)

Easton's syrup prepared according to the formula of the British Pharmacopæia 1932 is unsatisfactory, because it (i) rapidly develops a colour, first pink, later darkening to brown, (ii) deposits a white precipitate, and (iii) supports the growth of the moulds. The writer studied the changes and chemical reaction involved by storing the medicine in bottles loosely plugged with cotton-wool to allow exposure to air, and at normal temperatures under conditions most favourable to the development of changes. As a result of this observation he maintains that (i) there is no development of colour in the absence of iron, (ii) part of the colour, in which sucrose plays some part, is due to oxidation of constituents other than the alkaloids, (iii) the main colour is due to an oxidation reaction involving both the ferrous phosphate and quinine, and (iv) sucrose and glycerin retard the latter reaction. It is known that, owing to oxidation by air, ferrous iron is oxidized to the ferric state. The writer's opinion is that the ferric phosphate so formed in the syrup is still further oxidized, the presence of sucrose facilitating such a reaction, to any oxy-salt, producing a brown colour. The nature of reaction is supposed to be that in the presence of ferrous phosphate as a catalyst, quinine is oxidized by oxygen of air to quininone, quitenine, then quiteninone. Meanwhile ferrous phosphate is slowly oxidized to ferric phosphate and the ferric iron combines with these oxidation products, most probably with quiteninone which contains a product of the produc tains an acid group, forming coloured compounds. earlier product or products of oxidation give a pink colour, where the later compounds give the brown colour. Glycerine tends to stop the reaction at the first stage where the pink compound is formed, whereas sucrose allows the reactions to go to completion, although both substances retard the rate of reaction. In the absence of iron no oxidation products of quinine form and therefore there is no intensification of colour.

The precipitate consists of amorphous ferric phosphate and acid quinine phosphate (one molecule of quinine united with one molecule of phosphoric and sulphuric acids), the latter of which are crystals (i.e., quinine sulphate phosphate) and may be absent on account of the solvent action of glycerine where this

is present in the syrup.

The studies have also been made in this investigation regarding the factors affecting the development of colour and precipitation, viz, temperature, light, oxygen, modification of the vehicle, addition of organic and inorganic acids, and it has been summarized that

(i) glycerine is advantageous in reducing the degree of coloration,

(ii) the problem of precipitation is best approached by the use of acids which readily form soluble

saits,
(iii) hypophosphorous acid, a reducing agent although it retards precipitation, causes a greater development of colour,

(iv) hydrochloric acid is most satisfactory in prevent. (iv) hydrochloric acid is most satisfactory in preventing coloration and precipitation, and
(v) owing to the fact that moulds will grow in the

present official syrup, an increase in the syrup or glycerine content is indicated.

The paper has also suggested an improved formula and its method of preparation,

Iron 8.6 gm. Phosphoric acid 35.0 c.em. Strychnine hydrochloride 0.3 gm. 13.3 gm. 50.0 c.cm. Quinine hydrochloride . . Dilute hydrochloric acid Syrup 660.0 c.c. . . Glycerine 140.0 c.cm. Distilled water to 1,000 c.cm.

Phosphoric acid is dissolved in 70 c.cm. of distilled water in a suitable container. Iron is added to this and dissolved by heat on a water bath, and to this and dissolved by hear on a water bath, and to this a solution of strychnine and quinine hydrochlorides in dilute hydrochloric acid (50 c.cm.) is added. The whole is filtered into the syrup and glycerine, previously mixed, and sufficient distilled water is next added through the filter to produce the required volume. This is the acid solution of the alkaloids and ferrous phosphate. The acid solution crystallizes on long standing and cooling. Glycerine, 140 c.cm., dissolves without the application of heat and crystals formed in 200 c.cm. of this acid solution only by shaking occasionally, showing that quinine hydrochloride phosphate is readily soluble in this solution. The colour and precipitation will be inevitable to a certain degree but they are not formed to any great extent with the improved formula. (Abstracted by M. L. C.).

#### Surgery of the Common Bile-duct (Bradshaw lecture for 1939)

By SIR JAMES WALTON, K.C.V.O., M.S. (Lond.), F.R.C.S., F.A.C.S.

(Abstracted from the Lancet, Vol. II, 16th December, 1939, p. 1253)

THE biliary tract is subject to many anatomical variations, several of which are of great surgical importance. The cystic artery may lie below or in front of the cystic due to the hensite front of the cystic duct or curve in front of the hepatic duct and, if accidentally cut, cause severe hæmorrhage, in the controlling of which the common bile-duct of the hepatic duct may be tied (figure 1a). The main hepatic artery or its right branch may loop up behind the gall-bladder (figure 1b) and be divided in mistake for the cystic arrery cousing poerceis of the liver for the cystic artery, causing necrosis of the liver. Very rarely the cystic duct is absent, the hepatic duct or ducts opening into or ducts opening into one side of the gall-bladder and the common duct emerging on the other (figure 16). Much more commonly the state of the gall-bladder and the common duct emerging on the other (figure 16). Much more commonly the cystic duct is unusually long and even opens into the ampulla (figure 1d), if this is not recommend the ampulla (figure 1d). this is not recognized, stones in the common duet may easily be overlooked, and after cholecystectomy a portion of cystic duct may be left, which may into a pouch, containing stones almost as large as into a pouch, containing stones, almost as large as

the original gall-bladder. It is often in the seemingly easy case that danger is seen for a thin the seemingly easy case that danger is seen for a thin transfer of the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that danger is seen as the seemingly easy case that the seemingly easy case the seemingly easy case that the seemingly easy case that the seemingly easy case that the seemingly easy case the seemingly easy case that the seemingly easy case the seemingly easy case that the seemingly easy case the seemingly easy case that the seemingly easy case that the seemingly easy case the seeming arises, for a thin patient with a low, mobile and easily everted liver often has mobile ducts, so that traction applied to Hartmann's nearly ducts, so that traction everted liver often has mobile ducts, so that traction applied to Hartmann's pouch draws out a loop of the common duct (figure 1e), which is mistaken greatly cystic duct and divided. This danger is begun increased if the resection of the gall-bladder is begun at the fundus, when the traction is greater and the deep at the fundus, when the traction is greater and the deep at the fundus, when the traction is greater and the deep at the fundus, when the traction is greater and the deep at the fundus, when the traction is greater and the deep at the fundus, when the traction is greater and the deep at the fundus, when the traction is greater and the deep at the fundus, when the traction is greater and the deep at the fundus of the common duct that the latter may be added to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct that the latter may be applied to the common duct proached n soluble

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mistaken for the cystic duct and divided. So common are these variations that it should be an invariable are these variations in this region should be divided rule that no structure in this region should be divided rule mad three ducts and the cystic artery have been until all three ducts and the cystic artery have been

identified (figure 3b).

Sometimes the duct has not been completely divided, but the injury had led to a stricture and incomplete obstruction. All such strictures of the common duct obstruction. All such strictures of the common duct are not, however, due to injury at a previous operation. It is often stated that a stone which has long been impacted in the common duct, and which may occasionally perforate it, may cause ulceration which in its later healing may stenose and obstruct the duct. In my experience this has been very rare. In my own series there were 20 cases of division, six traumatic strictures and five inflammatory strictures.

#### REPAIR OF LESIONS

These lesions, if recognized at the time, can generally be rectified by immediate end-to-end suture; but if they are unrecognized one of two conditions will follow. If the upper end of the duct is open, the bile escapes and does not pass into the intestine. Such patients may remain in fair health for a considerable time, and an operation for repair will usually be performed before their condition has seriously deteriorated. If, on the other hand, the duct has been ligatured, the patient rapidly becomes profoundly jaundiced, with complete absence of bile in the stools. Her health rapidly deteriorates, owing to back pressure on the liver, and at times the secretion of bile pigment may cease entirely, so that the distended duct is filled with a fluid like thin mucus, the so-called white bile. Any operation on such a patient is a serious risk. The most hopeless examples are those in which the common duct has been divided below in mistake for the cystic duct, and, as the gall-bladder is drawn out by traction, the two hepatic ducts are again divided high up in the hilum of the liver, into which they retract, so that at the second operation no trace of the duct can be

When there is a fistula or obstruction, the lower end of the duct is, as a rule, indiscernible, and the upper end of the duct has to be united with the duodenum; for the gall-bladder has generally been removed, and a cholecystoduodenostomy is therefore impossible. If the cut end of the duct can be easily approximated to the duodenum, Mayo's direct implantation often suffices; but it is difficult to make a valvular opening,

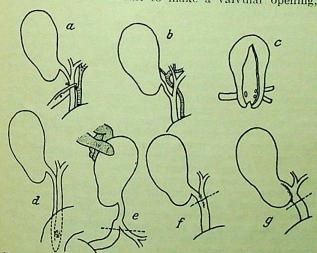


Fig. 1.—Anomalies possibly leading to lesions of the bile-ducts; (a) cystic artery lying below cystic duct has the common bile-duct is accidentally clamped; (b) loop hepatic artery accuration permet position of cystic of hepatic artery occupying normal position of cystic artery; (c) congenital absence of cystic duct; (d) long cystic duct opening into ampulla; (e) mobile loop of (f) cystic duct drawn up by traction on gall-bladder; (e) cystic duct adherent to hepatic duct; (g) Hartmann's pouch adherent to common bile-duct. pouch adherent to common bile-duct.

and there is a risk of ascending infection. A fistulous tract may be carefully separated from the abdominal wall, and its lower end may be implanted into the duodenum, but this does not give a valvular opening, and the greater part of the new duct, not being lined by epithelium, is liable to cicatrize and stenose, leading to obstruction. When direct anastomosis is impossible, the Sullivan method of inserting a tube between the cut end of the duct and an opening in the duodenum and wrapping the tube in omentum can be used. Here and wrapping the tube in omentum can be used. Here again the internal fistula left between duct and duodenum is lined by omentum only and likely to stenose. To overcome these dangers of subsequent stenosis and ascending cholangitis in the absence of a standard and according into the duodenum. I deviced an valvular opening into the duodenum, I devised an operation (figure 2) whereby a new duct was made from a flap of duodenal wall, which was sutured round the tube inserted by the Sullivan method. This ensured an epithelial lining for at least three-quarters of the gircumference of the duct and allowed a valualer of the circumference of the duct and allowed a valvular opening. If the liver has suffered badly from back pressure, much improvement may follow a slow decompression. The duct is opened, a long tube inserted and fixed, the wound closed, and the liver slowly decompressed. At a second operation performed about two weeks later the tube is cut off about 3 inches below the duct on opening and then made in the below the duct, an opening and flap made in the anterior wall of the duodenum, and the new duct reconstructed in the usual way. In the almost hopeless cases in which no trace of the upper end of the duct can be found an incision may be made into the liver substance, and the resulting biliary fistula may be united to the duodenum. united to the duodenum.

#### CONGENITAL DIVERTICULUM

A congenital diverticulum of the common bile-duct consists of a very rare dilatation extending from the duodenum to the cystic duct or sometimes to the hepatic ducts (figure 3a). Its contents may amount to

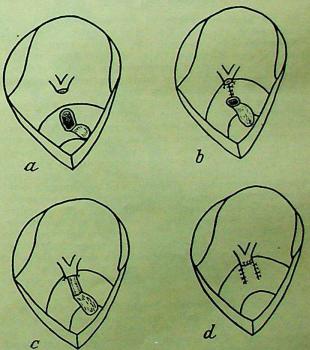


Fig. 2.—Reconstruction of common bile-duct; (a) opening made in duodenum and flap turned back; (b) subtract of stump of common bile-duct to duodenum and closure of upper part of opening in duodenum with sutures; (c) insertion of tube to connect stump of common bile-duct with opening in duodenum;

(d) suture of duodenal flap round tube.

several pints, suggesting an ovarian cyst or even a pregnancy. The most constant symptom is attacks of severe colicky pain, often associated with jaundice. The diverticulum has been known to rupture, the

symptoms then resembling those of a perforated peptic ulcer. Not only is the condition often overlooked on clinical examination, but also it may be missed at operation. The reason is probably that the gall-bladder is generally not dilated, and the diverticulum may be covered by membranous sheets. It cannot be too strongly emphasized that, if a patient has symptoms

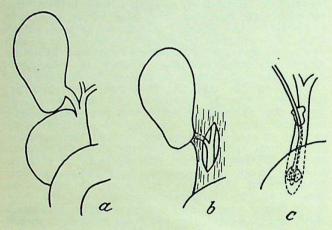


Fig. 3.—(a) Congenital diverticulum of common bileduct; (b) exposure of all three ducts; (c) removal of stone through stump of cystic duct.

suggesting gall-stones, the common duct must always be examined. If this rule is followed, the diverticulum cannot be overlooked. If left, the condition appears to be always progressive and ultimately fatal owing to back pressure on the liver. A choledochoduodenostomy should always be performed.

#### IMPACTED GALL-STONE

Of the acquired lesions of the common duct the commonest is the impaction of a gall-stone.

Symptoms.—As a general rule, when a stone passes down the duct it causes attacks of severe colic, shortly followed by evidence of interruption in the flow of bile: white stools, dark urine and jaundiced skin and conjunctivæ. The stone may then pass and the whole attack be over; but, even if the stone does not pass, the spasm of the duct may abate, the bile pass again, and a false sense of security arise. Soon, however, the attacks are repeated, and, although the pain tends to become steadily less, the jaundice becomes more persistent, although the characteristic form a jaundice in this type of obstruction is variable or perhaps even definitely intermittent. The skin and conjunctivæ tend to remain bright orange, unlike the grey-green appearance in the late stages of the jaundice of a complete obstruction. Although the obstruction is incomplete, the duct becomes dilated and perhaps infected, and the liver rapidly suffers from back pressure. Although the ducts dilate, the gall-bladder is rarely distended from impaction of a stone in the common duct, probably because it is fibrosed from previous attacks of cholecystitis.

Jaundice.—It is usually taught that an operation in followed by evidence of interruption in the flow of bile:

Jaundice.—It is usually taught that an operation in the presence of jaundice is a serious proceeding, and that it is better to wait until the jaundice has disappeared. This is entirely contrary to my experience. The risk in my cases has always been due to the back pressure on the liver, and, although the jaundice may vary, the damage from the back pressure steadily progresses as long as the obstruction remains. The danger of hæmorrhage in the presence of jaundice has always seemed to me an academic myth, and I have found little or no value in preliminary calcium therapy. The patient may be watched for a few days to see if the stone will pass, but, generally speaking, the presence of jaundice is an urgent indication for operation. For this reason the diagnosis of obstructive jaundice from that due to a toxic or infective hepatitis is extremely important.

The differential diagnosis is best made from the clinical history and by physical examination. In my cases the van den Bergh test has been of very little laundice due to hepatitis usually has an inside cases the van den Bergh test has been of very little cases the van den Bergh test has been of very little help. Jaundice due to hepatitis usually has an insidious onset with no pain. There is often a slight pyrexia during the first few days, or, if the jaundice is of gastro-intestinal toxic origin, there is evidence of gastro-intestinal toxic origin, there is evidence of gastro-intestinal disturbance preceding the jaundice. In the infective cases several persons living in the same house may have been affected, and there is no past history. The jaundice may be complete or incomplete, and in the have been affected, and there is incomplete, and in the jaundice may be complete of incomplete, and in the early stages the liver is usually enlarged and often tender. In some cases of gall-stone obstruction, however, colic is absent; but there is usually a past history of flatulent dyspepsia or of attacks suggesting and there is often a tenderness over the control of the co history of naturent dyspepsia of of attacks suggesting cholecystitis, and there is often a tenderness over the gall-bladder. If the differential diagnosis cannot be made, an operation should be undertaken if the jaundice has not abated in six weeks. So long a wait jaundice has not abated in Six weeks. So long a wait may risk damage to the liver, but this risk may be less than that of performing a useless operation on a patient dangerously ill with hepatitis. With such a wait an organic obstruction is usually found at operation.

A stone may be impacted in the common duct without causing jaundice; therefore absence of jaundice must never be regarded as evidence that the duct is clear. If a stone is impacted, the duct above usually shows some dilatation and the cystic duct a relatively large lumen owing to the passage of a stone down it; but these changes may be relatively so slight that they are often overlooked. If there is any doubt, the duct should always be palpated from without. It has been said that even very small stones can be felt in this way by the trained finger; but often I have removed from the common duct stones which I had failed to palpate from without. Therefore no operation on the gall-bladder can be considered complete unless the common duct has been explored and the patency of its lumen made evident. Such an exploration, however, may increase the danger of the operation. It in such a case there has never been any jaundice, the cystic duct is small, the common duct is not dilated. and nothing can be felt from without, it may be considered that the risk of overlooking a stone in the duct is less than the risk of overlooking a stone in the duct is less than the risk to the patient of exploring it; and a simple cholecystectomy may be performed, but a note should then always be made that the duct was not explored, and the patient should be carefully watched after the operation.

Recurrent stones.—Some of the recurrent stones found in the common duct may have been formed therein after the first operation. This possibility considerable of the first operation. therein after the first operation. This possibility siderably affects the prognosis. If there is a cholangitis siderably affects the prognosis. and a stone is removed, another may form later, but if it is an overlooked stone, it is improbable that a second will escape notice. A stone formed in the common duct in cholangitis consists of relatively soli pigment calcium and contains no cholesterin whereas pigment calcium and contains no cholesterin, whereis a stone formed in the gall-bladder is laminated. Of the 65 cases of recurrent calculi in my series only nine of those in the common duct were pure pigment, the remainder being laminated stones. Hence I believe that most of the recovered to the recover have been overlooked at the first operation, and that true recurrences are rare. For this reason I have duct should be washed out with ether. Ether dissolves purpose the duct and It is therefore better always to explore the duct and to dilate the ampulla to allow small fragments to pass.

Operation—A free convents in the common duct that the common purpose is the duct and the common purpose is the duct and the common purpose is the duct and the common purpose is the common purpos that most of the recurrent stones in the common that

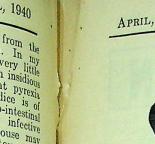
Operation.—A free exposure must always be made slightly arched on the gall-bladder rest, and the following of the table slightly tilted downwards, good especially to the ducts, can always be obtained occasionally a transverse incision of the whole ness of the abdominal wall or of the posterior only may be useful. The Kocher incision employ. I am aware that several very experienced and skilled surgeons advocate its use, but I have seen Operation.—A free exposure must always be made

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several large ventral herniæ after its use by other surgeons, and in other cases of recurrent calculi where this incision had been previously employed I have the times agreent of the rectus attraction. found the upper segment of the rectus atrophic, owing

to division of its nerve supply.

The intestines below having been packed off and the gall-bladder drawn upwards and outwards, the peritoneum of the edge of the gastrohepatic omentum is divided, and the ducts are carefully dissected. Usually the three ducts—cystic, common hepatic and common bile—are easily identified; no structure whatever must be divided until all three have been identified. The cystic duct is now divided and clamped; the cystic artery, identified and distinguished from a loop of the right hepatic artery, ligatured and divided. The clamp is slipped from the lower end of the cystic duct, a dissector inserted down it and the duct slit up. It is the usual custom to close the cystic duct and to explore the common duct through a separate incision. As a rule the slitting up of the cystic duct is preferable. Only one opening is made in the duct, and, when it is sutured, no stump can be left to form a new pouch like a gall-bladder—a complication which I have seen in three cases. The only condition in which a separate opening is necessary in the common duct is when the cystic duct is very long and opens into the ampulla. When the cystic duct has been slit up, a pair of very fine forceps is passed downwards, any stone removed (figure 3c), and the forceps then passed through the papilla and opened as widely as possible, so as to dilate fully the opening of the duct. This I regard as the complete operation which is desirable in every case and only to be shortened in those patients who are bad operative risks. Since the routine use of this procedure I have not met with any symptoms due to spasm of the sphincter of Oddi. In a few cases a stone may be so firmly impacted in the ampulla that it cannot be displaced upwards and withdrawn by forceps. A

transduodenal approach with incision of the papilla

may then be necessary.

The next question is that of drainage of the common usual indications for this procedure are: (1) great dilatation of the common duct; (2) recurrent calculi; (3) soft pigment calculi; and (4) pus in the calcul; (3) soit pigment calcul; and (4) pus in the ducts. If the forceps can be passed freely into the duodenum and dilated, many of these cases may be left without drainage. In other words, internal is substituted for external drainage, and I generally only drain externally a duct which contains purulent bile. For drainage I never use a T-tube; its withdrawal is likely to injure the duct, and its use is never necessary. If the bile is very infected, a smooth rubber tube If the bile is very infected, a smooth rubber tube should be inserted up towards the hilum of the liver. If the infection is less, the tube may be passed downwards towards the duodenum, in which case some bile may pass downwards alongside it. The tube should always be fixed in position with a fine intestinal catgut suture and the duct closed round it. It should not be withdrawn until the tenth day. The gall-bladder is now removed, the cut edges of the peritoneum of the gastrohepatic omentum sutured over the stump of the sutured cystic duct or round the tube, and the suturing continued upwards to unite the edges of the gall-bladder bed. Whether the common duct is drained or not, a tube should always be inserted down to Morison's pouch, for in some cases small accessory ducts open directly into the gall-bladder and may discharge a small quantity of bile. This tube can usually be removed in twenty-four to forty-eight hours.

The results of expection the matter of the control of the contr

The results of operation show that the impaction of a stone within the common duct must always be regarded as a serious complication. Most of my fatal cases have had symptoms suggestive of liver failure, and it is for this reason that I advocate early operation before the heavily demand has advanced to a severe before the hepatic damage has advanced to a severe

#### Reviews

MINOR SURGERY AND THE TREATMENT OF FRACTURES (HEATH, POLLARD, DAVIES): FOR THE USE OF HOUSE SURGEONS, DRESSERS, AND JUNIOR PRACTITIONERS. Twenty-second Edition.—By G. Williams, M.S., F.R.C.S. With a Chapter on 'The Administration of Anæsthetics' by H. N. Webber, B.Chir., D.A. 1940. J. and A. Churchill, Limited, London. Pp. viii plus 472, with 283 illustrations. Price, 12s. 6d.

DR. CHRISTOPHER HEATH was born two years before Queen Victoria came to the throne, and at the age of twenty-six he works twenty-six he wrote the first edition of this book, which has been the bible of three generations of house surgeons and dressers and is now brought up to date surgeons and dressers and is now brought up to date ready to serve a fourth. The book was known as Heath and Pollard in the reviewer's student days, for Bilton Pollard took over the editorship when Dr. Heath died in 1905, and since then the book has passed through ten more editions under the editorships passed through ten more editions under the editorships of Mr. Morrison Davies and the present editor. It has also been to be a superior of the control of th

has also been translated into Chinese.
The book has had many imitat pretentious and many remarkably good, but none have replaced this book in the reviewer's esteem and the reason is not by any means a sentimental one.

The big event since the last edition has been the troduction of the editor Ine big event since the last edition has been the introduction of sulphanilamides, but, as the editor points out, it is too soon to be sure how far their introduction has modified the procedure for the treatment of septic wounds; so he decided not to make to be dogmatic

Another section where advances have necessitated revision is in the subject of anæsthesia.

The book is still one of the best twelve-and-six-pence worth that the student entering on his term in the out-patient departments and surgical wards can purchase.

A SHORT TEXTBOOK OF SURGERY .- By C. F. W. Illingworth, M.D., F.R.C.S.Ed. Second Edition. 1939. J. and A. Churchill, Limited, London. Pp. x plus 707, with 12 plates and 189 text-figures. Price, 21s.

In these days of specialization it takes a great deal of courage to write a textbook on general surgery. Yet the student must have his textbooks, and, to look at it from his point of view, if he is expected to acquire a certain degree of general knowledge on surgery, which is only one of many subjects in his curriculum, surely he can expect an experienced surgeon to be able to broaden his own knowledge sufficiently to write a textbook that will cover the student's requirements.

The author of this textbook is fully conscious of the difficulties of his task; he modestly and very neatly defines the limits of his ambition when he says, 'the most I can hope is that my neurology will satisfy the urologists, my gynecology the orthopædists'.

The author's courage and industry have been rewarded for he has produced a book that will have an immediate appeal to the student and if he assimilates an immediate appeal to the student and it he assimilates the contents intelligently he will not only satisfy his examiners, but will have acquired a very sound grounding in surgery that will stand him in good-stead when he goes into general practice, or form a firm foundation on which to build special surgical knowledge, should he wish to take higher examinations in surgery.

As this is a second edition, no special criticism of the contents is necessary. No material changes have been made, for the first edition only appeared a year

It is a book very well suited to the requirements of the student in this country and practitioners will find

it a useful book of reference.

MINOR SURGERY.—By R. J. McNeill Love, M.S. (Lond.), F.R.C.S. (Eng.). 1940. H. K. Lewis and Company, Limited, London. Pp. vii plus 369, with 155 illustrations. Price, 12s. 6d.

This is a new 'minor surgery'. The author has followed very much the orthodox lines, except that he has pressed into his service a number of collaborators, about which he has given the reader very little information, beyond their names at the beginnings of the chapters they have contributed. In these days of specialization, it is perhaps as well to have the teachings of a number of experts, even on a limited subject like this; skilful editing has ironed out any unevenness in the various contributions.

There are other books which cover the same range

of subjects and it is difficult to judge between them. This book, however, is a very satisfactory one. It is easy to handle and slips into the pocket, it provides as complete a guide to practice in the casualty and surgical out-patients as a dresser or house surgeon could wish for, and the price is very reasonable.

The illustrations are numerous and where necessary they are in colour, the binding is strong and is innocent of the varnish which is such a joy to the tropical cockroach, the methods described are practical, and the

teaching sound.

RECTAL SURGERY: A PRACTICAL GUIDE TO THE MODERN SURGICAL TREATMENT OF RECTAL DISEASES.—By W. Ernest Miles, T.D., F.R.C.S. (Eng.), F.R.C.S.I. (Hon.), F.A.C.S. (Hon.). 1939. Cassell and Company. Limited, London. Pp. xi plus 359 with 105 illustrations. Price, 17s. 6d.

In his preface the author has stated with modesty that this book 'is nothing more than a record of my personal interpretation of the various problems presented to me by rectal disease and of the methods of treatment which experience has proved to be most efficacious'. It is precisely for these reasons that this little handbook will be readily welcomed by the practising surgeon and the senior student, for the name of Mr. Ernest Miles is linked with notable contributions in this branch of surgery.

It is of no little credit to the author that in a volume of this size, consisting of fifteen chapters, hardly anything of importance has been omitted. It is true that this monograph should not be regarded as a textbook, but as a practical guide and vade mecum it has no equal. Desperate diseases may require heroic measures and the greatest surgical skill and courage are called for in the treatment of carcinoma of the rectum. The evolution of the radical abdominoperineal operation is a case in point. Unfortunately there is a tendency to-day to revert to less radical measures, chiefly with a view to minimizing the rate of mortality. In the hands of Mr. Ernest Miles it has been brought down to the neighbourhood of ten per cent, a great achievement. Anorectal fistulæ comprise a subject beset with many difficulties well known to the practising surgeon, owing to the disastrous consequences of some operative methods. These will be remedied, in a great measure, by the anatomical classification and the rational operative measures advocated by the author. Another noteworthy feature of this book is the clear exposition of differential diagnosis.

The printing, get-up and illustrations are all excellent. An adequate index is appended. We strongly commend this book to the notice of the general practitioner for he cannot afford to be without it.

P. N. R.

THE STUDY OF ANATOMY.—By S. E. Whitnell, M.A., M.D., B.Ch. (Oxon.), M.R.C.S., L.R.C.P. F.R.S. (Canada). Fourth Edition. 1939. Edward Arnold and Company, London. Pp. 124

THERE is little doubt that this revised and enlarged THERE IS little doubt that all concerned with the edition will be welcomed by all concerned with the study of human anatomy, i.e., both students and

teachers.

The book consists of seven chapters of which the first two are mainly devoted to outlining 'the principles' of the subject and 'the practical methods' of study. These two chapters should be read and re-read by every medical student before beginning his own studies of the human body by dissection, if he is to avoid unnecessary memorization of the details. The third and fourth chapters are intended chiefly for teachers on whom lies the most onerous task of directing the student along the proper lines of study most conducive to the realization of essentials of anatomy and of infusing life into the study of the dead.

The fifth and sixth chapters are concerned with directions on 'general reading' and a very useful hint to the younger students in the matter of selecting good 'books' for their studies of human anatomy, as well as such other general books as have stood the test of time for widening their outlook and imagination. In the last chapter will be found not only a very selective list for reference but also a very wholesome suggestion of subjects for collateral reading by students and special studies by more senior students and

teachers.

In these days of the crowded medical curriculum, it is difficult to give more than a limited time to any it is difficult to give more than a limited time to any subject. To derive, therefore, the maximum benefit from limited studies of such a fundamental, yet essentially such a vast, subject as anatomy, it should of necessity be a well-designed and methodical procedure from the very beginning, so that the work may be arranged to enable one to obtain a thorough grasp of main facts, and carry the essential knowledge thus gained throughout the course of one's professional studies. studies.

We most strongly commend this book to all medical students and teachers, and, we are confident that a perusal of this book will widen the outlook of the reader, who will have reason at the end of his studies to be grateful to the learned author for such an

excellent production.

The publishers' task in the matter of the format, printing and paper has been uniformly satisfactory.

PATHOLOGY: AN INTRODUCTION TO MEDICINE AND SURGERY.—By J. Henry Dible, M.B. (Glas.), F.R.C.P. (Lond.), and Thomas B. Davie, B.A. (Cape.), M.D. (L'pool.), M.R.C.P. (Lond.). J. and A. Churchill Limited, London. Pp. x plus
931, with 374 illustrations including 8 plates in colour. Price, 36s.

THE publication of an entirely new book on pathology is an important event and teachers in all medical schools where the Taylor and teachers in all medical schools where the Taylor and teachers in all medical schools where the Taylor and the schools where the schools are schools and the schools are schools are schools and the schools are sc medical schools where the English language is used will be, or should be were the English language is used not be, or should be, very interested; by this we do not mean only teachers of pathology but of medicine and surgery, for, as the authors of this book emphasize, pathology should be taught as an introduction to medicine and surgery.

medicine and surgery.

The highest aim of medical science should be always before the student, and he should be taught to think in both directions; not only must forwards from the pathological processes of the active stages of the disease, which he can visualize, he still has to visualize, or to the final stage of disease with the can see in the post-mortem room or operation theatre, but also backwards to the process of invasion theatre, but also backwards to the process of invasion the pathological agent, and still further back which epidemiology of the disease, to the conditions with effect the contact of the human organism with causal agent or which make the former susceptible to causal agent or which make the former susceptible

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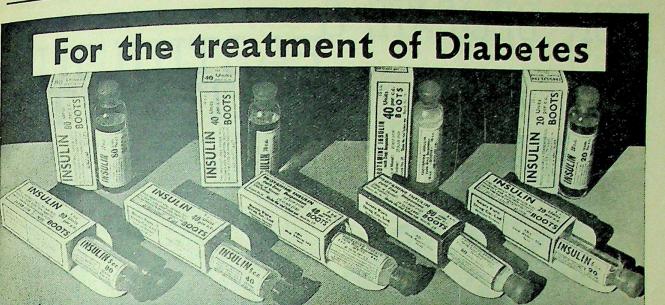
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EDICINE . (Glas.), B.A. vie, B.A. ). 1939. p. x plus plates in

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the malign designs of the latter, so that he, the student, will always think in terms of prevention as well as

of cure.

The authors have kept this ideal well to the fore in their presentation of the subject. They have aimed at presenting a living and progressive picture of the disease processes; they have laid great emphasis on the disease. So that the physician or surgest genesis of disease, so that the physician or surgeon can visualize what is happening inside a patient when he looks at him and makes his physical examination, and the limited pathological examinations that can be carried out during life; and they have for the most part avoided descriptions and illustrations of postmortem tissues and museum specimens. Finally, they have striven throughout the book not to divorce pathology from clinical medicine and surgery, and in order to keep the student in close touch they have often included short clinical descriptions of the diseases whose

pathology they are teaching.

The standard practice of dividing the subject into general pathology and regional pathology has been followed, but between these two sections a section on special infections has been interposed. This section is not just a treatise on bacteriology or parasitology, for it deals with the reactions of the body to the infections rather than with the organisms themselves, and further it is not comprehensive but aims at giving type infections. No descriptions of animal parasites have been included, and the reasons the authors give for this are rather poor, namely, that they illustrate no special principles in pathology, and that they are so well described in books of parasitology. The first, if our interpretation of the meaning of the sentence is correct, is not true, and the second could be applied to many subjects dealt with in the book.

There are two excellent chapters on diseases of the lood. The story of the evolution of our present knowledge on pernicious anæmia is particularly good; the recent work on the pathology of the stomach in this disease is included; in fact more than this, it is repeated, for figures 193 and 282 are identical. More recent observations regarding the pernicious anæmia of infection with Diphyllobothrium latum, or dibothriocephalus latus as the authors write it, question the causative connection between the anæmia and the helminthic infection: both pernicious anæmia and this particular helminth are common amongst Finns, and

the association may be accidental.

The authors have taken many of the illustrations of blood cells from Whitby and Britton's book and it is a pity they did not also take more of their principles of hymotoless. of hæmatology. They give the hæmoglobin in a typical normal blood count of a man of 45 as 95 per cent—Haldane (which in terms of grammes of hæmoglobin per 100 c.cm. of blood is 13.1) and we know of not country. country where this can be considered the average amount; in most countries it is at least 2 grammes higher than this. Nor do we consider that 2.0 mgm. (4 units) of bilirubin in the blood could be considered anything but pathological.

The authors are professors of pathology at the universities of London and Liverpool, respectively, and are therefore both experienced teachers, and they have presented the subject in a rational, clear, and interesting manner. Their book should make a very useful textbook for the student and we strongly recommend textbook for the student and we strongly recommend it to the teacher in this country. There are a few mistakes in four in the second will be seen that these will mistakes, in facts as well as in figures, but these will undoubtedly be corrected in subsequent editions, and even as it to be corrected in subsequent contrieven as it stands the book is a very important contribution to the teaching of medicine, in its widest sense, and we foretell a bright future for this new venture.

VADE MECUM OF MEDICAL TREATMENT. By W. Gordon Sears, M.D. (Lond.), M.R.C.P. (Lond.).
Second Edition. 1939. Edward Arnold and Company, London.
Pp. vil plus 376. Price, 10s. 6d.

THE fact that the author has found it necessary to produce a second edition of this book in just over two years bears testimony as to its growing popularity and usefulness.

The book provides in a convenient form and handy size an excellent synopsis of medical treatment of all size an excellent synopsis of medical treatment of all diseases commonly met in general practice. The contents are generally arranged in alphabetical order to facilitate ready reference. The appropriate lines of treatment for a particular case should be selected by the practitioner from the different therapeutic procedures given in this book, which are based on the author's personal experience, and information taken author's personal experience and information taken from recent literature and standard books. Occasional reference has been made to methods and points of diagnostic importance.

In addition to the various modern lines of treatment already referred to in the previous edition, the present volume includes the main advances in therapeutics, e.g. chemotherapy, in the form of the sulphanilamides and allied drugs and zinc protamine insulin. A few useful tables have been added in the appendix.

The book will continue to be a valuable guide to treatment in general medical practice.

M. N. R. C.

INDIGENOUS DRUGS OF INDIA: THEIR SCIENTIFIC CULTIVATION AND MANUFACTURE NUMEROUS SUGGESTIONS INTENDED EDUCATIONISTS AND CAPITALISTS.—By J. C. Ghosh, B.Sc. (Manchester). Second Edition. 1940. Published by P. K. Ghosh, School of Chemical Technology, Calcutta. Pp. xvi plus 243. Price, Rs. 3 (postage extra). 5s. 6d. (postage free).

THE first edition of this handbook was published in 1919 and consisted of a series of independent pamphlets on the subject of pharmaceutical industries in India. While this children has been thousand the control of t in India. While this edition has been thoroughly revised and considerably enlarged, the original plan has been generally retained and an attempt has been made to stimulate the interest of the reader in the scientific cultivation, manufacture and use of the Indian

indigenous drugs.

Having had the advantage of being associated with a large manufacturing establishment in India, Mr. Ghosh is fully aware of the needs and also the latent possibilities that exist for the development of new pharmaceutical industries in this country and has presented all these technical facts together with his personal experiences in a readable and interesting manner which should provide food for thought to all those who are keen to see India become independent

in the matter of her drug supplies from foreign countries.

The book is divided into three main chapters and three appendices. In chapter I, the scientific and commercial aspects of drug cultivation and the problem of drug adulteration and spurious drug trade in India are described. The author has maintained that India with her vast resources of vegetable materia medica should be in a position not only to supply her own needs but should be able to export substantial supplies to foreign countries. The reason why India is still largely dependent on imports is, according to the author, the fact that adulteration and tampering with the quality of crude drugs has been the rule rather than the exception in the Indian drug market—a view with which the reviewer finds himself in general agreement. To remedy this situation, Mr. Ghosh has strongly advocated the enactment of an all-India Drugs and Pharmagus legislation. Here again the author will find Pharmacy legislation. Here again, the author will find many in India to fall in line with his view-points. In chapter II, the author has given brief notes on the pharmaceutical and therapeutic aspects of a few Indian indianage of the state pharmaceutical and therapeutic aspects of a few Indian indigenous drugs such as aconitum, ajowan, Allium sativum, aloes, Atropa belladonna. Hydnocarpus wightiana, etc., which he himself studied. The information contained herein is however of a very preliminary nature. Chapter III deals with the market facilities for crude drugs in London and elsewhere. The data given are interesting but do not appear to be of much technical value from the point of view of drug dealers. dealers

Of the appendices, appendix I, containing a list of vegetable drugs with their natural orders, habitat, and therapeutic uses, and their vernacular equivalents in

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nine languages, should be of particular value for reference purposes. In appendix II, a set of useful prescriptions is given with the idea that these will be 'particularly useful to mofussil and other people wanting cheap and easily available medical aid'. The information given here is certainly not enough to guide laymen and the reviewer feels that this sort of meagre treatment of a subject may do more harm than good by encouraging self-medication. This appendix again is not quite relevant to the theme which the author has in mind and could easily have been omitted.

The author deserves congratulation for bringing to the forefront, in a low-priced easily-readable handbook, the forefront, in a low-priced easily-readable handbook, a subject which is of paramount importance to a poor country like India, particularly at this time when an acute shortage of drugs due to supplies being cut off on account of the war is already evident. The problem of supplying India's 400 million people with drugs and medicinal chemicals can only be solved by utilizing India's indigenous drug resources and developing indigenous drug industries, as Mr. Ghosh has advocated. Industrialists may find a lot of useful hints from a perusal of this book.

B. M.

DIAGNOSIS AND MANAGEMENT OF DISEASES OF THE BILIARY TRACT.—By R. Franklin Carter, B.S., M.D., F.A.C.S., C. H. Greene, A.B., Ph.D., M.D., F.A.C.P., and John Russell Twiss, A.B., M.D., F.A.C.P. 1939. Baillière, Tindall and Cox, London. Pp. 432. Illustrated with 84 engravings with 6 plates. Price, 32s. 6d.

THE authors are members of the professorial staff of the New York Post-graduate medical school, and their book is based on their experience with diseases of the biliary tract over a considerable period of time, especially at their hospital's clinic for the study of diseases of the liver and biliary tract.

The preface promises a concise description of the latest concepts of the ætiology of diseases of the gall bladder and the routine of investigation and management as practised at this clinic. This is accomplished in the short space of four hundred pages with great

success. The opening chapters discuss the current opinion on various ætiological factors, and they serve to show how much has yet to be clarified despite the constant interest that is being taken in these problems throughout the world.

For example, a review of the theories regarding gall stone formation shows that no single factor can be responsible for their causation, but that biliary stasis is probably of most importance. The difficulty lies in the probability that, by the time a gall stone has appeared, the conditions determining its deposition have altered.

The second part is concerned with the investigation of patients. The technique of duodenal drainage is described in detail, and the significance of the findings

The Twiss tube, as used at this clinic, is at present the most reliable method of obtaining bacteriologically uncontaminated specimens of bile from the duodenum, and the results that are being obtained deserve attention. Other methods of investigation are described, and mention must be made of intravenous cholecystography, described by Dr. Hubbard Lynch.

Two admirable sections follow, describing respectively medical and surgical treatment, and it is not easy to single out passages for special comment. In the medical section the diet sheets are adaptable to the needs of patients in this country, and in the surgical section we all have something to learn from the articles on

the selection of patients for operation.

Wider aspects of surgery in relation to biliary tract disease occupy part V, and finally space has been found for an appendix containing various useful tables.

A carefully written and authoritative work, this book

should be in the hands of everyone interested in the subject.

W. McN. N.

STHMA.—By Frank Coke, F.R.C.S. With the collaboration of Harry Coke, M.R.C.S., L.R.C.P. Second Edition. 1939. John Wright and Sons Limited, Bristol. Pp. xii plus 266. Illustrated. Frank Coke, F.R.C.S. ASTHMA.—By

THE authors have tried to face squarely all the factors of the clinical synderical synde The authors have tried to face squarely all the factors involved in the production of the clinical syndromeasthma. They have strongly advocated the use of the differential sedimentation test in classifying the factors into three main groups and throughout this book these three types have been referred to, emphasized, and reiterated. The book contains abundant interpretative material and expressions of personal observation and material and expressions of personal observation and experience. The chapter on allergy is exhaustive; the value of treatment on bacteriological lines has been fully emphasized. The book contains extensive discussions on the intractable forms of asthma and records of gratifying success after treatment.

The chapters on other complaints allied to asthma, such as hay fever, urticaria, migraine, rhinitis, angio-neuratic cedema, eczema, cyclical vomiting, epilepsy, and angina pectoris, have been dealt with shortly. The authors have, however, effectively revealed the urgency of losing no hope in dealing with asthmatics.

G. N. S.

FUNCTIONAL DISORDERS OF THE FOOT: THEIR DIAGNOSIS AND TREATMENT .- By Frank D. Dickson, M.D., F.A.C.S., and Rex L. Diveley, A.B., M.D., F.A.C.S. 1939. J. B. Lippincott Company, Philadelphia and London. Pp. x plus 305, with 202 illustrations. Price, 21s.

THE title of this book is apt to be misleading, because all the disorders of the foot which it describes have an essentially organic basis.

The preliminary section on morphology and anatomy is largely taken from the work of D. J. Morton, whose opinions diverge in some respects from those of English writers, such as Keith and Lake. Although Morton argues against the existence of an anterior transverse metatarsal arch, the authors of this book take sides with the majority in assuming that this arch does in

Foot imbalance in childhood, adolescence, and adult life is then discussed. Stress is laid on the occurrence of foot imbalance in childhood as a factor in producing the structural defects that underlie most of the fool troubles of adult life.

Treatment is described in the appropriate chapters, with modifications according to the age of the patient. It is directed towards the increase of tone, correction of short tendo achillis, the modification of footwear, the use of arch supports and death of the direction of the supports and death of the pattern of the patte the use of arch supports, and, lastly, operation. A type of non-rigid support designed by the authors is

It has the great advantage that the surgeon himself can fit the support to the patient's foot in the space of a few minutes. described.

The last part of the book describes diseases of the integument and small bones that cause painful feet, the list of omissions from this section is long. Comes a useful section containing illustrated notes of strapping and foot evereigns.

strapping and foot exercises.

The book has been well published, with clear illustration with clear illustration. trations and in an exceptionally readable fount.

W. McN. N.

THE MECHANISM OF THE HUMAN VOICE. BY A Churchill, Limited, London. Pp. ix plus 205, with 20 illustrations. Price 40e 6d

The author covers a very large field, commencing as the does with the nature and development of voice, as illustrated in the lower animals, and finally he is the clearly and methodically worked out. The development chapters on development, the details of anatomy of vocal organs are dealt with, including all the chief work in this line. Dealing with the motor organs

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# A Call for Help

Veganin Tablets present acetylsalicylic acid, phenacetin and codeinein synergistic combination, whereby the individual action of each constituent is greatly enhanced.

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The call of pain is seldom stilled, and relief is of primary importance to the suffering patient. The paroxysmal pain of dysmenorrhoea, the persistent and intense throbbing of migraine, the shooting pains of neuralgia, the pain in affections of the bones and joints, the pain resulting from accidents—all these, and many other conditions, yield with impressive readiness to the sedative and analgesic efficacy of Veganin. With Veganin there is no systemic disturbance, no habituation. It may therefore be safely entrusted to the patient as a dependable means of relieving and preventing pain.

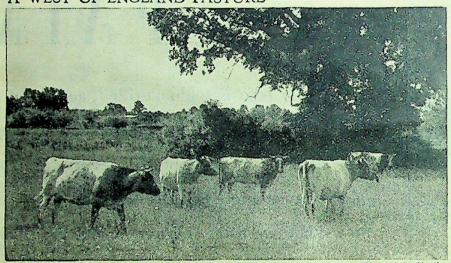
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# FRIGHTSH OWS

A WEST OF ENGLAND PASTURE



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This English Food from English meadows with its wholesome nutrition has brought a great deal of happiness to mothers in India. Firm flesh without flabbiness, sound well-defined bones, and the smile of Health and Happiness—these are some of its attributes. Richest of all in Vitamin D (250/300 International Units per pint of milk). It is not repacked in India.

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concerned, the author describes the larynx and its adjuncts and describes in detail the anatomy and physiology of these parts and the possible action or actions of the larynx as a vibrating system in the production of voice. The function of the psychic centre to speech, the manner in which afferent impulses are for speech, the manner in which afferent impulses are enabled to influence its action are briefly discussed in connection with the function of cerebrum and cerebellum. The cortical control of the voice has been the subject of dispute among many authorities; the author has discussed the points and is of opinion that the paracentral gyrus, the posterior, triangular or orbital parts of the inferior, frontal gyrus and the superior, middle and inferior temporal gyri are the controlling centres for speech.

The allied function of hearing too is not neglected and brief outlines of the anatomy and physiology of hearing and its important relationship to voice is hearing and its important relationship to voice is discussed. Although the technique of analysing sound has not reached a stage of perfection, the author has given an interesting account of the more important experimental methods. Lastly, the disorders of voice and speech have been studied from different view-points and the author has based the abnormal state upon anatomical, physiological, and psychological and anatomical, phy linguistic defects. physiological,

The author brings to his task experience of many years as a student of physics, phonetics, psychology, anatomy, physiology, and laryngology. He has ably marshalled the facts and has presented both sides of marshalled the facts and has presented both sides of arguments in controversial matters and has drawn his conclusion in a logical manner. The result is a book of first importance that fills a real need in medical literature and will be recognized as an authoritative work of reference to physicians, scientists, and teachers of elocution. It contains an extensive bibliography. The book is profusely illustrated. Though small in size, it is worth its price for the vast amount of information concentrated in such a small volume. tion concentrated in such a small volume.

M. N. D.

A TEXTBOOK OF BACTERIOLOGY: THE APPLICA-TION OF BACTERIOLOGY AND IMMUNOLOGY
TO THE ÆTIOLOGY DIAGNOSIS SPECIFIC TO THE ÆTIOLOGY AND IMMUNOLOGY TO THE ÆTIOLOGY, DIAGNOSIS, SPECIFIC THERAPY AND PREVENTION OF INFECTIOUS DISEASES FOR STUDENTS AND PRACTITIONERS OF MEDICINE AND PUBLIC HEALTH.—By H. Zinsser, M.D., and S. Bayne-Jones, M.D. Eighth Edition. 1939. D. Appleton-Century Company, Incorporated, London. Pp. xxviii plus 990. Illustrated. Price, 30s.

This book has a thirty-year reputation as a sound book on bacteriology, falling somewhere between the students' handbook and the complete encyclopædia on the subject. Hiss and Zinsser was a reference book that was frequently found in the army bacteriological laboratories during the last war; these books were probably the second and third editions, and we have no doubt that the eighth edition will be found just as frequently in the corresponding laboratories in this war. frequently in the corresponding laboratories in this war.

By this we do not mean to suggest that it particularly deals with war conditions, but that under service conditions libraries had to consist of only one or two books, and one could nearly always find anything on the theory or practice of laboratory work associated with the micro-organismal agents of human disease in this book. For this reason, but for this reason only it is book. For this reason, but for this reason only, it is perhaps a pity that the section on protozoa is omitted. The reasons given for this omission include the very obvious one that protozoa are not bacteria and that they have their own literature, and, secondly, the very honest reason that the authors don't know enough about the subject; a fact that so seldom deters writers

of this type of book.

If protozoa have been left out, organisms on the smaller side of the scale, rickettsiæ and viruses, have received their fair share of attention; in fact, the section on rickettsia is one of the best in the book.

Becant work on virus diseases has necessitated

Recent work on virus diseases has necessitated considerable additions to this section; our knowledge has both extended, that is to say more diseases are now recognized as ultra-microscopic virus diseases, e.g., influenza, and becomes more precise, for we now know many facts about viruses which distinguish them one from another. All the recent work on yellow fever has been added in this edition, including reference to protective vaccine now made by growth on chick

This is perhaps the most readable of all books on bacteriology. Professor Zinsser has a delightful literary style which continually peeps through the sober presentation of facts which naturally forms the substance of a scientific work. His admirers will welcome this new edition and those who were previously unfamiliar with it will be delighted with their new experience. It is a book to be recommended, unconditionally.

A NEW DICTIONARY FOR NURSES.—Compiled by Lois Oakes, S.R.N., D.N. (Lond. and Leeds). Assisted by Thos. B. Davie, B.A., M.D. (Liverpool), M.R.C.P. (Lond.). Sixth Edition. 1940. E. and 8. Livingstone, Edinburgh. Pp. xx Illustrated. Price, 3s. Postage 2d. Pp. xx plus 410.

This is a very complete vocabulary of medical terms as required by nurses; it also contains a useful summary of diets and nursing technique, and is strongly to be recommended for both student and qualified nurses.

AIDS TO ANATOMY AND PHYSIOLOGY FOR NURSES.—By Katharine F. Armstrong, S.R.N., S.C.M., D.N. (Lond.). 1939. Baillière, Tindall and Cox, London. Pp. xil plus 384, with 163 figures. Price, 3s. 6d.

This is a valuable summary of the subject, and should prove very useful to nurses revising their knowledge and as a sound basis for their medical and

C. F.

### Abstracts from Reports

REPORT ON THE STATE OF PUBLIC HEALTH IN BURMA DURING 1938

VOLUME I

Principal diseases

In Burma the major epidemic diseases are cholera, plague and smallpox. These diseases are so well known that villagers are able to distinguish them easily and report their incidence to headmen. The improvement of sanitation and the protection of public health including the prevention of the spread of contagious and infectious diseases among human beings are the and infectious diseases among human beings are the responsibilities of the local bodies both in rural and

urban areas. While a few of the municipalities have a staff sufficient to deal with an outbreak of epidemic disease, the district councils have to depend upon this department for the provision of qualified medical personnel for taking the necessary preventive measures.

Cholera.—This disease was not prevalent during the year. The provincial death rate was 0.05, which is below the previous year by 0.24 and the five-year mean by 0.15. Seventy out of the 106 deaths from cholera

Seventy out of the 106 deaths from cholera by 0.15. Seventy out of the 106 deaths from cholera recorded in the urban areas were in Toungoo where the disease appeared in epidemic form, the cases in the

other 11 towns being of a sporadic nature.

Plague.—The number of deaths due to plague is the highest since 1929 and the death rate 0.38 shows an

increase of 0.25 compared with the previous year and 0.24 over the five-year mean.

Smallpox.—The death rate from smallpox, 0.02, is the lowest for the past 22 years. It is below the previous year's figure by 0.09 and the five-year mean by 0.10. Mortality was reported from 19 out of 31 districts. The largest number of deaths took place in April and the least in October.

Enteric fever.—This is a notifiable disease in all towns in Burma. The health officer has to depend mainly on private practitioners and doctors in charge of hospitals to furnish him with information regarding morbidity. Apart from admissions into hospitals, the number of cases reported by medical practitioners are few. It is not therefore possible to furnish the number of persons down with this disease. With regard to deaths, the health officer or medical registrar has in most cases to rely on the history given by the relatives of dead persons and on the examination of dead bodies. Under the circumstances the mortality figures can at best be taken to indicate only the relative providers. best be taken to indicate only the relative prevalence of the disease.

During 1938, 451 deaths were recorded and the death rate of 0.32 is less than the previous year by 0.01.

Dysentery and diarrhea.—These accounted for 6,400 deaths during the year. The death rate is 0.53, which represents a decrease of 0.05 below the previous year but an excess of 0.05 compared with the five-year mean.

The largest number of deaths took place in the month of July and the least in March.

Respiratory diseases.—The number of deaths ascribed to this group of diseases is 14,297 and the death rate of 1.8 shows a rise of 0.03 compared with the previous year and 0.11 compared with the five-year mean. The rate for rural areas is 0.32 and that for towns is 7.70. Of the 10,871 deaths recorded in towns under this head, 4,685 were ascribed to pneumonia, 2,757 to pulmonary tuberculosis, 15 to whooping cough and the balance to other respiratory diseases. These figures indicate that pneumonia and pulmonary tuberculosis were responsible for the major portion of the deaths.

Beri-beri.—There has been a marked rise in the incidence of this disease during the year.

The total number of deaths recorded from this cause in towns was 460 and the rate 0.33 is the highest for the past nine years. The Health Officer, Rangoon Corporation, reported 534 attacks and 265 deaths. The disease was mostly confined to the Indian community, the Telegus from South India being more prone to the riberi and the Mohammedans from Bongal and beri-beri and the Mohammedans from Bengal Chittagong to epidemic dropsy. Other towns recording a large number of deaths were Moulmein 34, Nyaunglebin 32 and Mergui 26.

Cerebro-spinal meningitis.—Reports were received about the continued prevalence of this disease in the early part of the year in the Haka subdivision in the Chin Hills district. Cases occurred in three villages. In the Upper Chindwin district six cases with six deaths were reported from Layshi village in Somra tract. The situation needs watching. In the towns of Burma 51 deaths were recorded, of which 39 were in Rangoon.

Malaria.—Burma like other tropical countries has its problem of malaria to contend with. The disease is extensively prevalent and causes much sickness and mortality especially in the rural areas. Unfortunately we have no reliable data to gauge its prevalence in villages, where the headmen who act as registrars cannot differentiate the various kinds of fever. From blood counts and spleen censuses taken in various places in Burma, the Malaria Bureau, at the Harcourt Butler Institute of Public Health has been able to distinguish regions where malaria is endemic from regions where it is only slightly prevalent. In the year under report fevers accounted for 38.39 per cent of the total mortality. In the opinion of public health and medical officers who have opportunities to observe the mortality caused by malaria, half the deaths ascribed to fevers in rural areas may be taken to be due to malaria. On this basis, approximately 57,000 deaths in villages this year were due to malaria.

Leprosy.—The number of deaths due to leprosy in towns during 1938 was 353, the rate being 025. By towns during 1938 was obs, the rate being 025. By far the largest number was recorded in Rangoon 136, Mandalay 59 and Moulmein 20. The existence of leper asylums in these places has been mainly responsible for the large number recorded. The disease is made the collection of the large number and Mônywa Municipalia. for the large number recorded. The disease is made notifiable only in Maymyo and Mônywa Municipalities, hence there are no reliable statistics to judge its hence there are no remained in respect of rural areas even mortality figures are not available.

As a result of the appeal issued by His Excellency the Governor of Burma in December 1937, a central association with a strong and influential executive committee was formed with the object of controlling committee was formed with the object of controlling tuberculosis and leprosy. Up till the end of the year a sum of Rs. 4,50,681-7-11 has been collected and vested in a Board of Trustees.

The Director of Public Health, Burma, furnished the association with an outline of work for combating the association with an expert in the person of the person of

leprosy. The services of an expert in the person of Dr. J. Lowe, M.D., Leprosy Research Worker of the Indian Council of the British Empire Leprosy Relief

Association were obtained.

His report has thrown valuable light on the distribution and incidence of leprosy in Burma. From a study of statistics and other records he remarks that there is probably a belt of country showing a high incidence of leprosy extending across the middle of the province starting with the Chin Hills and Hill Tracts of Arakan and Akyab in the west including most of the southern part of Upper Burma and finishing with the Southern Shan States in the east. A second zone showing a moderately high incidence of leprosy is in the Delia. northern part of Burma showing relatively little leprosy, and the coastal areas showing still less. The type distribution of cases in Burmans differs markedly from that of Indians domiciled in Burma or India and that in Burmans cases of infectious or lepromatous type form a much higher proportion of the total. The high percentage of children infected with leprosy points to the fact that the disease is spreading.

Tuberculosis.—It is not possible to judge the extent

of prevalence of this disease in the rural areas but in towns 3,016 deaths were recorded under this head during the year. Of these, 2,757 were due to pulmonary tuberculosis, 9 to tuberculosis of joints and the rest to other tuberculosis.

to other tuberculous diseases.

The death rate from pulmonary tuberculosis has been steadily on the increase since the year 1920, when figures in respect of this disease were available for the first time. In 1920, it was 152, 164 in 1937 first time. In 1920 it was 1.13, in 1927 1.64, in 1937

2.05 and this year 1.95. Yaws.—From time to time evidence has been accumulating as to the areas in which this disease is rampant in Burma but measures for its eradication were not put into operation on an extensive scale on account of the cost involved in the treatment of cases.

ANNUAL REPORT OF THE ALL-INDIA INSTI-TUTE OF HYGIENE AND PUBLIC HEALTH, CALCUTTA, 1938

RESULTS of practical value have been achieved in investigations into the causation of epidemic dropsy a disease widely provinces investigations into the causation of epidemic dropsya disease widely prevalent in the eastern provinces
of India, where it is popularly, though erroneously,
known as beri-beri. Simple tests have been evolved
with which it is now possible to detect the poisonous
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The seeds of this weed, which resemble the black variety of mustard seeds, somehow find their way into the stocks of the letter. the stocks of the latter and constitute a poisonous recognized even by the villagers because of its petal be thorny leaves and yellow flowers and should removed from mustard fields to prevent contamination L, 1940

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APRIL, 1940|

# The Value of Dietary Supplements

A Summary of Investigations\* published in the "Medical Officer," March 30 and April 6, 1935

NUMBER of children, all receiving their customary home diet, were given either No Supplement, Cod Liver Oil, Halibut Liver Oil (with milk to provide equal calories) or Virol. The experimental scheme provided that each child should have a period on each treatment in turn, in such a way that every possible sequence was included. Rigid statistical control was thus possible.

Gain or Loss in Weight on Various Supplements:-

Supplement	Total gain in ozs. over all periods	Average gain per child per week in ozs. over all periods	Total loss in ozs. during summer period only	Average loss per child per week in ozs. during summer period only
No Supplement	88	0.3	<b>— 103</b>	. — 1.4
Cod Liver Oil	287	1.0	- 77	<u> </u>
Halibut Liver Oil with milk	333	1.2	— 184	- 2.6
VIROL	762	2.6	- 7	0.1

Whereas earlier investigations had shown that the mere addition of vitamins had no effect on growth, these investigations have conclusively proved that Virol-a balanced food containing all the necessary vitamins -has a definite and remarkable effect in bringing the rate of growth up to the recommended standard. Virol was the only one of the supplements used that promoted this ideal rate of growth.

Virol was the one and only preparation that maintained the children's weight in the hot weather.

\* The full report will be sent on application to Messes. A. H. Wheeler & Co., Sudama House, Wittet Road, Ballard Estate, Bombay.

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, 1940

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of the oil seeds. Regular examination of stocks of of the on seeds in shops and mills should also go a long mustard seeds in shops and mills should also go a long way in preventing expression of the poisonous oil and frequent examination of mustard oil exposed for sale should check the use of undesirable supplies for cooking purposes.

Investigations at the institute have shown that rats cause epidemics of severe diarrhea and certain obscure fevers resembling typhoid. A high percentage of rats has been found to carry infection, and the pest must be systematically destroyed even in the absence of plague, and food, through which infection is carried to man, must be carefully protected from it.

Investigations have also shown that a mild form of

scurvy is one of the ways in which the body is left damaged by malaria and that lime juice is a good remedy. The principle has been applied in the new treatment, of black-water fever evolved at the institute which has so far proved successful.

It has been observed, that there is, in epidemics, a preponderance of one type of malaria parasite over another. It is now possible on the basis of this finding to forecast the probable incidence of the disease.

A survey has been made in selected localities of the

diets taken by different communities and it has been found that though, as a rule, people who can afford to spend reasonable amounts on food and obtain proper nourishment, this may not always be the case and useful indications have been obtained of the directions in which food in certain communities needs correction.

with the help of an apparatus evolved at the institute, with which it is possible to study the effect of light on the deeper membranes of the eye, it has been shown that as many as 17 per cent of men taking what is called an adequate diet and 43 per cent of those taking a poorer diet show signs of deficiency. Only in 16 per cent of the latter group was external evidence of deficiency diseases manifest. Most of them made rapid recovery when the element which was deficient in their diet was realized. deficient in their diet was supplied.

A simple method has been worked out of studying the structure of the teeth, which gives indications of efficiency in the assimilation of lime by the human being, and the milk-teeth of children when they drop out, can now be utilized for a study of the nutritional history of the child.

Active research is being carried out to discover the causes of high incidence of tuberculosis in the jute industry. The incidence of tuberculosis of the lungs was found to be as high as 2 per cent amongst workers in a jute mill near Calcutta, with an additional 5 per cent or more of probable cases. The seriousness of the problem can be gauged from the fact that industries such as this attract labourers from far and wide and from tuberculosis, they form a fruitful source of infection for the non-immunized population of the

ANNUAL REPORT OF THE HEALTH OFFICER OF THE CITY OF BOMBAY EXECUTIVE

THE conditions of public health of the city during the year were not so satisfactory as they should have the year were not so satisfactory as they should have been. Smallpox which was prevailing at the end of the preceding year assumed an epidemic form at the commencement of the year and the epidemic lasted followed by an epidemic of enteric fever which considered the satisfactory as they should have been satisfactory as the satisfactory as they should have been satisfactory as they should have been satisfactory as the followed by an epidemic of enteric fever which coninued by an epidemic of enteric lever which continued till the end of the year, although the number of cases showed a decline from the month of October.

The number of live births registered was 36,748, being 1938 more than in 1927 and 6,738 more than the 1.293 more than in 1937 and 6,738 more than the average of the last ten years (1928-37). The birth-rate coloulet of 1931 was rate calculated on the census population of 1931 was 31.6 births per 1,000. The total number of deaths from all causes was 35,999, being 5,231 more than in 1937, 7,092 more than the average for the last five (1933–37) and 8,608 more than that for the

preceding decennium (1928-37). The death rate per 1,000 of census population of 1931 was 31.0 as against 26.5 in 1937 and 22.8 the rate recorded for the decennium (1928-37). Thus the number of births during the year was more by 749 than the number of deaths. This excess of births over deaths was equivalent to 0.6 per 1,000 population calculated on the census of 1931 and was recorded eight times in census of 1931 and was recorded eight times in succession. Before 1931 there was no such excess since 1866, the year in which birth records were instituted.

There was no death from plague during the year as against 46 the average of the last ten years (1928-37). Smallpox was in an epidemic form during the first half of the year and caused 1,862 deaths as against 688 in 1937 and 941 the average for the last decennium

Cholera caused one death (the case was imported) against 4 in 1937 and 21 less than the average for ten years (1928-37).

Influenza was prevalent in a mild form in the city during the year and caused 80 deaths as against 68 in the preceding year and 71 the average for the last decennium (1928-37)

The deaths from diseases of the respiratory system numbered 13,584, being 2,343 more than in 1937 and 3,710 more than the average of the last ten years

Tuberculosis accounted for 2,078 deaths as against 2,037 in 1937 and 1,710 the average for the preceding decennium (1928-37)

One hundred and three deaths were due to malaria, being 30 more than in 1937 and 32 less than the average of the last decennium (1928-37). There were 1,065 deaths from ague and remittent fever as against 1,298 in 1937. The average number of deaths for the last ten years (1928-37) from malaria was 135 and from ague and remittent fever 1,373.

The deaths among infants under one year of age numbered 9,801 against 8,688 in 1937 and 7,856 the average for the last ten years (1928-37). The rate of infant deaths per 1,000 births registered was 267.0 as against 245.0 for the preceding year and 261.8 the mean for the preceding decennium (1928-37).

#### THE REPORT OF THE CHIEF ENGINEER, PUBLIC HEALTH DEPARTMENT, BENGAL, FOR THE YEAR 1938

Revival of the policy of making grants-in-aid towards sanitary engineering schemes of local bodies gave a definite investment to the local bodies gave a definite impetus to local self-governing institutions to undertake such schemes. Although, owing to the absence of a sufficient number of mature schemes, the total expenditure on such schemes during the year under review was less than during the previous year, there was a distinct rise in the estimated cost of projects taken up during the year.

The total capital expenditure on water-works and sewerage works constructed or under construction during

the year under review amounted to Rs. 5,99,816 and Rs. 1,46,097, respectively, as against Rs. 7,50,326 and Rs. 52,027, respectively, during the previous year.

There were 53 water-works in operation in the province under the control of the department during the year under review. The total number of persons served was 1,342,467 and the total quantity of filtered water supplied, 17,748,042 gallons. The quality of water supplied from the various water-works was, on the supplied from the various water-works was, on the whole, satisfactory.

the valuable assistance municipalities and other local bodies in the shape of inspection and advice, new works of sanitary engineering, numbering 20, were executed under the supervision and control of the department during the year. The improvement of rural water-supply was one of the most important activities of the department. A rural water-supply subdivision, consisting of one assistant engineer and these supervisors was created towards the end and three supervisors, was created towards the end of the previous year. The assistant engineer-in-charge of the subdivision inspected several places in the

province in order to make arrangements for water-supply by tube-wells in rural areas. A leaflet on iron eliminators was prepared and circulated. The assistant engineer also made an extensive tour in the district of Bakarganj to investigate the possibilities of watersupply by tube-wells in rural areas. The data elicited during the tour will be of value in the preparation, already undertaken, of a comprehensive water-supply programme for the district.

The schemes of water-supply by means of tube-wells in rural areas formulated by district boards and the prospects of water-supply by tube-wells in such areas out of the grants made by the Government of India as well as the provincial grants and loans were examined by the Public Health Department and necessary reports

were sent to district boards and to Government.

The department also rendered valuable assistance to Superintendents of Police on specific problems relating to the improvement of tube-wells in rural thanas.

In several parts of Eastern Bengal the water yielded by village tube-wells is so heavily impregnated with by village tube-wells is so heavily impregnated with iron salts, and in some cases also with manganese, as to be practically undrinkable. For this reason, ring or masonry wells have proved more popular in these areas than tube-wells, although the water yielded by the former is often of doubtful quality. To remedy this, designs of various economic types of iron eliminative control of the really water prepared by tors for use with village tube-wells were prepared by the department and experimented upon in several places; and a simple type has been now evolved and placed on the market.

#### THE ANNUAL REPORT OF THE DIRECTOR OF THE PASTEUR INSTITUTE OF SOUTHERN INDIA, COONOOR, FOR THE YEAR ENDING 31ST DECEMBER, 1938

RADICAL alterations in the administration organization of the laboratories were commenced during the year. The course of action was necessitated by a variety of factors among which may be mentioned the continued demands for increased quantities of antirabic vaccine, the ever-increasing volume of speciments The course of action was necessitated by a sent for laboratory examination, and the fact that the accumulation of reference works and periodicals had outgrown the space available in the original library. Adequate laboratory accommodation had also to be provided for the newly appointed rabies research officer.

During the year under review 406 patients underwent a full course of antirabic treatment at the institute. Of these, 36 were Europeans and 370 Asiatics, figures which showed a decrease of 20 in the total number treated as compared to the previous year.

Incomplete courses of treatment were also given to 82 patients. Of these, 44 were absolved from further treatment as the animals under suspicion remained alive and well for an observation period of 10 days thereby excluding rabies. The remaining 38 absconded. The proportion of absconders to the total treated (complete and incomplete) was 7.8 per cent.

One death from rabies occurred among the Asiatic patients treated at the institute. received a full course of treatment. This patient had

Paris fixed virus was used exclusively in the preparation of the vaccine. It was in its 1011th passage at the close of the year. The vaccine used was a 5 per cent carbolized sheep-brain suspension prepared by Semple's method.

During the year, 16,172 courses of antirabic vaccine were issued to the subsidiary centres, a figure which shows an increase of 801 courses as compared to the

previous year.

The number of deaths from rabies among all treated cases (complete and incomplete) was 20, giving a mortality rate of 0.17 per cent. Of the 20 deaths from rabies 8 or 0.07 per cent occurred among the patients who had received a full course of treatment and 12 or 0.49 per cent among those whose courses of treatment were not completed. In the latter group, seven patients developed rabies while receiving treatment and the other five occurred among absconders.

Antirabic vaccine is also available for the prophy. lactic treatment of animals. While it is advocated that lactic treatment of animals. While it is advocated that dogs should be protected before they are exposed to infection, it is found in practice that treatment is infection, it is found in practice that treatment is infection, it is found in practice that treatment is comparatively seldom given until the animal is at risk. During the year, 40,831 c.cm. of 5 per cent carbolized sheep brain vaccine were issued for the treatment of the delivery of the property of the year. animals, chiefly to veterinary officers in the Madras Presidency and neighbouring Indian States.

Presidency and height-duling laboratory examinations.

The number of routine laboratory examinations which the institute performed on behalf of hospitals which the institute performed practitioners continuously. which the institute performed on benan of hospitals dispensaries and medical practitioners continued to show an increase. The total number of such examinations carried out during the year was 4,756. Work of this kind covers a wide field and includes examinations of a hæmatological, serological, pathological, bacterio-

logical and biochemical nature.

The institute also continued to receive, examine and report upon brains from suspectedly rabid animals. During the year, 414 such specimens were received. No charge is made for this service and, where necessary, the results are communicated by telegram free of charge.

Some experiments were carried out on the cultivation of rabies virus in tissue culture. Attempts to cultivate rabies virus on the chorio-allantoic membrane of the

developing hen's eggs were unsuccessful.

Towards the close of the year some preliminary experiments were commenced with the object of improving the antirabic vaccine at present in use. The present vaccine while satisfactory from the point of view of a low associated mortality among treated cases is far from satisfactory in respect of the dosage and

duration of treatment.

A research unit known as the 'Protozoal Parasites Enquiry' was attached to the institute during the year and is under the control of the director. This unit is entirely financed by the Indian Research Fund Association and is the first of its kind that has come under the direct control of the director of the institute. work of the enquiry during the short time available before the end of the year was taken up chiefly in establishing colonies of experimental animals, strains of parasites, etc., and no results of importance were obtained. The future programme of study of this enquiry will be devoted mainly to the investigation of importance were considered. of immunity to malaria and other protozoal diseases.

#### THE FOURTEENTH ANNUAL REPORT OF THE HOSPITAL. MENTAL INDIAN RANCHI KANKE, IN BIHAR, FOR THE YEAR 1938

THE hospital continues to receive patients from the

The sanctioned accommodation of the hospital including the emergency beds was the same as in the previous years, males 1,108, females 272, total 1,380.

Ever since the inception of the hospital (1925) we were not short of a bed in the female section but this section is now full and a selection to increase the Provinces of Bengal, Bihar and Orissa.

section is now full and a scheme to increase the accommodation by 48 beds without prejudice to health of the inmates is under the consideration of Government.

The appended table shows the number of patients sident in the beautiful Government. resident in the hospital on the 1st January, 1938, and

the two previous years:-Female 1,324 1,318 1,302 Year Male 256 1,068 1938 256 1937 1,062 249 1,053

been sufficiently educated as to the advantages of early treatment of mental diseases. During the year notice review 175 patients were admitted into the hospital so-called 'new admissions' for treatment, the majority of whom were old chronic cases for whom notice. It appears that the public mind in India has not your sufficiently educate being mind in India has not you of whom were old chronic cases for whom nothing could be done but palliative treatment with no of recovery. This has been our misfortune which inception of this modern Mental Hospital which immense facilities for the treatment of early case. immense facilities for the treatment of early case

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, 1940

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Total

1,324 1,318 1,302 has not yell year under hospital a

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#### States Nervous

of the manifestations of nervous disorders, STUDY neurasthenia, hysteria and the various types of neurosis, shows that there is frequently an associated impairment of the general nutrition of the patient. Conversely, it is found in practice that measures taken to improve the nutrition of the patient are generally followed by a definite amelioration of the nervous state.

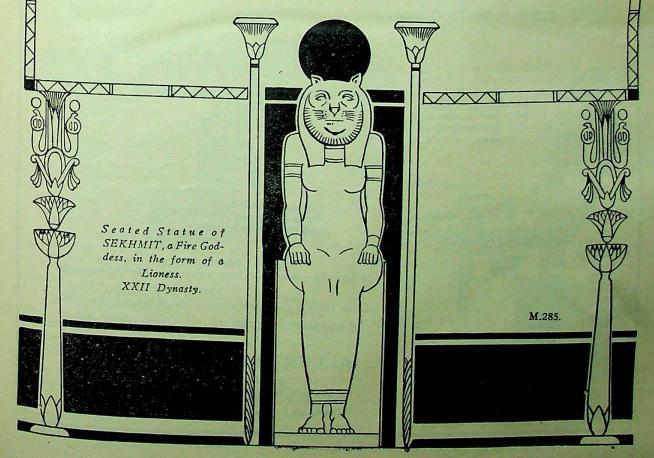
'OVALTINE' in addition to its wellknown high nutritive value, exerts a distinct sedative effect on the nervous system, which renders its use of special benefit in the treatment of functional nervous states. Where insomnia is an additional feature, its use before retiring is conducive to restful sleep.

'OVALTINE' is a natural tonic prepared from full-cream milk and malt extract. in the vitamins A, B (complex) and D and in readily assimilable calcium, phosphorus and Its carbohydrate content is chiefly in the form of quickly-available maltose.

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ST. BARTHOLOMEW'S HOSPITAL

OPERATION TABLE

with the

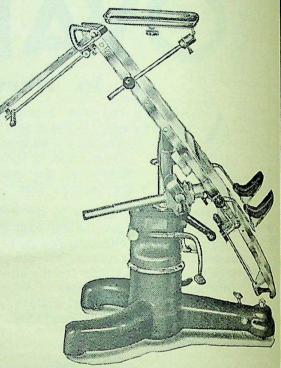
## Latest Improvements

including

Easy to operate Release Lever for lowering the table; Trendelenburg position increased to 55° tilt; Foot operated rubber-covered Floor Brake.

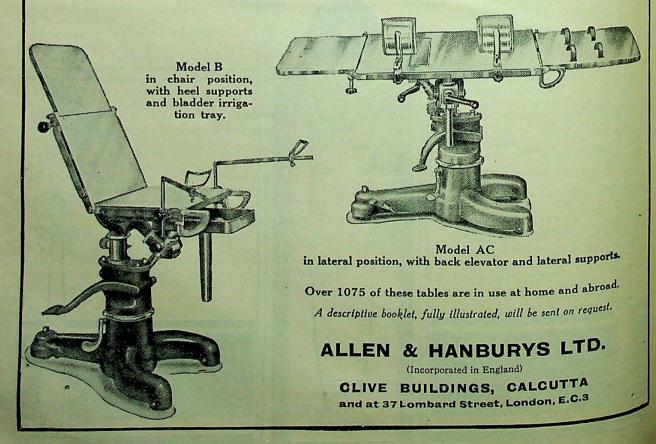
The St. Bartholomew's Hospital Operation Table is now manufactured in five different models and thus supplies a range of modern operation tables embodying the latest ideas of well-known surgeons for carrying out surgical operations.

All models can be supplied with either tripod or platform base.



Model A

In Trendelenburg position, 55° tilt,
showing shoulder rests and
instrument tray in position.



-, 1940

Mental disease is as curable as any general disease in its early stage. Those hospitals in the west which are fortunate enough to receive early cases for treatment, achieve 70 per cent recovery. The problem of encouraging early treatment cannot be solved without encouraging early treatment cannot be solved without securing the co-operation of the public and any measure which will conduce to this end is worthy of careful consideration. Apparently antipathy is strong on the part of the Indian public to mental disease and unless this is removed no progress in the treatment of early mental cases is possible in India.

The general health of patients was good through the conduction of t

The general health of patients was good throughout the year under report and there were no outbreaks of any kind of epidemic disease during the year.

Occupational therapy was in full swing as in the

past and an average employment of 80 per cent was maintained throughout the year under review. Occupation is the sheet-anchor of our treatment and every effort is made to provide suitable occupation for our patients according to individual capacity and require-

Rs. 600 was spent in distributing rewards to hard-working patients over and above the daily gifts of

cigarettes, tobacco and other comforts.

One hundred and sixty male and 29 female patients were given hydrotherapy during the year under report with gratifying results. The average hours of immersion per patient were 253.92 hours.

Cardiazol.—The following table shows the number of patients treated with this drug during the year and the results:—

the results:-

Number of cases Recovered Improved Stationary treated

In view of the reports of the stopping of epileptic fits by anti-rabic vaccine, we decided to adopt this form of therapy to our epileptic patients. Ten confirmed epileptics (eight males and two females) were selected for this experiment. We used anti-rabic vaccine prepared by the Pasteur Institute, Patna, Bihar. The full course of anti-rabic treatment with vaccine was given to each patient but the results were not encouraging.

ANNUAL REPORT OF THE LEPROSY HOSPITAL, DICHPALI, H. E. H. NIZAM'S DOMINIONS, INDIA, FOR 1938-39

During the past year, 216 patients have been discharged either symptom-free, or with the disease stationary and non-infective, as the result of treatment. Twenty years ago, such a statement would have been met with incredulity.

In the majority of cases, the patient can be sent home in good health and no longer a danger to others; and in some cases, if the treatment is begun in the early stages, every sign and symptom of the disease can be eradicated, as is shown by the fact that last year 27 of the stages. year, 27 of our patients were discharged 'symptom free'. This emphasizes the tremendous importance of early diagnosis and treatment.

There is, however, another less satisfactory aspect; during the year 791 patients applying for admission had to be refused. Of these, many would have derived benefit for the same of the

and to be refused. Of these, many would have derived benefit from hospital treatment, but owing to lack of accommodation they had to be sent away.

The general policy of the institution remains the same with regard to admissions and methods of treatment. From over a thousand applicants every year, those most suitable for treatment or most dangeryear, those most suitable for treatment or most danger-ous to the community are selected for admission; the majority of the cases thus selected are either infectious cutaneous cases, or moderately early neural cases (which usually respond well to treatment, but if untreated may progress to a more advanced and infective treated may progress to a more advanced and infective stage). The patients whom we cannot admit are referred to the nearest treatment centre to their own homes, so that they can take treatment as out-patients, and remain under medical supervision. This system, we are we are convinced, is of tremendous value, for only in this way can treatment be made available for the

thousands of lepers throughout the State; and we would like to thank all those members of the medical missions, who, by helping in this way, are making a most valuable contribution to the leprosy problem and the health of the State.

THIRTEENTH ANNUAL REPORT OF RAMAKRISHNA MATH CHARITABLE PENSARY, BRODIES ROAD, MYLA MADRAS, FOR THE YEAR 1939 MYLAPORE,

Among the centres of the order, the Math at Madras, now in existence for over 40 years, is a very influential one. As a side-activity of the Math the dispensary sprang up fourteen years ago. It was started in 1925 when Rao Sahib Dr. B. Raghavendra Rao, Retired Civil Surgeon of Madras, placed his voluntary service at the disposal of the institution, and undertook to meet the recurring expenditure required for the work. The recurring expenditure required for the work. The devoted and self-sacrificing services of Dr. G. S. Katre, of the late Dr. S. Krishnamoorty Iyer, and of Dr. B. Seshagiri Rao, in subsequent years, together with the substantial assistance of the members of the Math have enabled the institution to grow into a highly serviceable centre of medical relief in the city of Madras. During the first two years of its existence the total number of patients treated was only 14,523 whereas the last two years show the number to be 168,335, which clearly shows that there has been rapid progress in its service.

#### Correspondence

#### VITEX PEDUNCULARIS IN THE TREATMENT OF BLACKWATER FEVER

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I read with interest Dr. Measham's article on 'Vitex peduncularis in the Treatment of Blackwater Fever' appearing in the January 1940 issue of the Indian Medical Gazette. Indeed, there exists a combon heliaf amongst the treatment of the Prince of the Indian Medical Gazette. belief amongst the tea planters that Vitex peduncularis is a cure for blackwater fever, and it is for this reason that the plant is being cultivated in numerous tea estates and forest nurseries.

During recent years, the writer had a chance to observe closely not less than 20 cases of blackwater fever in Darjeeling-Terai, and has tried fresh decoction of the leaves of Vitex peduncularis in several of them.
Owing to the fame it enjoys as a cure for blackwater fever, usually the patient's relatives procure the leaves from the neighbouring forest nursery and produce it before the physician to make a trial of it. From the few cases on which the drug was applied, it appears to the present writer that it does not possess any curative effect against malarial infection, nor does it control the temperature; but a fresh decoction of the leaves induces diuresis and thus often forms an adjunct to the treatment, as it helps to eliminate the hæmo-globin with the urine, and, once the hæmolysis is controlled by other measures, the urine is cleared quickly. As a matter of fact, no doctor in this locality depends upon it for a cure, and atebrin, by one or other routes, forms the routine treatment.

The drug has possibly acquired its reputation in simple cases of hæmoglobinuria where no specific treatment is needed. Moreover, in cases with associated vomiting, the decoction is not retained well, and our experience differs from Dr. Measham's in this respect

> Yours, etc., J. C. BHATTACHARJEE, L.M.P.

CENTRAL HOSPITAL, DARJEELING HIMALAYAN RAILWAY, TINDHARIA, 10th March, 1940.

### Service Notes

#### APPOINTMENTS AND TRANSFERS

Colonel R. Sweet, p.s.o., to be A. D. M. S., Lucknow District. Dated 29th January, 1940.

Lieutenant-Colonel P. F. A. Grant, O.B.E., to be Officiating O. C., C. I. M. H., Dehra Dun. Dated 11th January, 1940.

Lieutenant-Colonel K. S. Master, M.C., to be O. C., I. M. H., Peshawar. Dated 29th January, 1940.

Lieutenant-Colonel M. P. Atkinson, an Agency Surgeon, is appointed as an Additional Medical Officer at the Lady Willingdon Hospital, Lahore, with effect from the forenoon of the 14th November, 1939, and until further orders.

Major R. N. Bhandari has, on return from leave, been posted as Superintendent, District and Central Jails, Agra.

On transfer from Sargodha Major J. J. Beausang assumed charge of the office of Civil Surgeon, Gujrat, on the 16th February, 1940.

Major A. E. Kingston, on being recalled to duty, assumed charge of special duty at the Dufferin Hospital, Rangoon, on the forenoon of the 18th February, 1940.

Captain S. W. Allinson, Civil Surgeon, Bassein, on being transferred to the Military Department, made over and Major R. McRobert received charge of the duties of the Civil Surgeon, Bassein, on the afternoon of the 31st January, 1940.

Captain C. J. H. Brink is transferred to the Civil Branch of the Indian Medical Service, and that officer is appointed as a leave reserve officer against the Central Indian Medical Service cadre, with effect from the 3rd February, 1940, and is posted as Special Famine Medical Officer in Ajmer.

Captain D. K. L. Lindsay, Staff Surgeon, Detention Hospital, Rangoon, reverted to the Civil Medical Department on the forenoon of the 3rd February, 1940. He assumed charge of the duties of the Civil Surgeon, Lashio, N.S.S., on the afternoon of the 8th February, 1940.

Captain G. E. S. Stewart was transferred to Civil employment in Madras, on 16th January, 1940.

On transfer from Gujrat Captain F. V. Stonham assumed charge of the office of Civil Surgeon, Sargodha, on the 20th February, 1940.

#### PROMOTIONS

#### Lieutenant-Colonels to be Colonels

P. B. Bharucha, p.s.o., o.B.E. Dated 6th October, 1939, with seniority from 30th July, 1933.

R. H. Candy, C.I.E. Dated 8th November, 1939, with seniority from 27th July, 1934.

W. C. Paton, M.C. Dated 10th November, 1939, with seniority from 27th January, 1935.

#### Major to be Lieutenant-Colonel

R. N. Bhandari. Dated 25th February, 1940.

#### Captain to be Major

A. B. Guild. Dated 4th February, 1940.

#### RETIREMENTS

Major-General E. W. C. Bradfield, c.i.e., o.b.e., retired 8th November, 1939.

Colonel W. E. R. Williams, O.B.E., K.H.S., retired. Dated 29th January, 1940.

Lieutenant-Colonel G. F. Graham, I.M.s. (retired), was released from service. Dated 11th January, 1940.

#### Note

#### A PAINLESS INTRAMUSCULAR ARSENICAL IN YAWS AND SYPHILIS

Intravenous injection of neo-arsphenamine products is impracticable in some cases of yaws, syphilis and other conditions requiring arsenic therapy. On such occasions, Acetylarsan, a pentavalent organic compound of arsenic, provides a valuable alternative treatment.

of arsenic, provides a valuable alternative treatment. Acetylarsan, injected intramuscularly, is almost painless, an advantage which should commend it especially to medical officers in outlying districts, who may be obliged to delegate a part of their work to unqualified assistants. In primary syphilis it has given results equal to those obtained with neo-arsphenamine, and there are numerous instances of cases, resistant to other forms of treatment, which have yielded readily to Acetylarsan.

A book providing comprehensive data on the indications, administration and dosage of Acetylarsan has recently been published, and will, we understand, be sent free to any medical practitioner on request to Messrs. May & Baker (India), Ltd., 11, Clive Street, Calcutta, India.

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## Original Articles

RÔLE OF OBLIQUE OSTEOTOMY OF UPPER END OF FEMUR IN HIP JOINT SURGERY .

By M. G. KINI, M.C., M.B., M.ch. (Orth.), F.R.C.S.E. Surgeon, King George Hospital, Vizagapatam (S. India)

THE problem of derangement of the hip joint as a result of congenital, traumatic and pathological causes, with or without dislocation, is a serious one.

Any alteration in the axis of weight-bearing through the hip joint leads to disability affecting both locomotion and stability. From a study of the normal weight-bearing, it becomes clear that the weight of the body is transmitted through the sacro-iliac joint on to the head of the femur and thence along the shaft of the femur to the lower leg. In the orthograde position, stability is given to the hip joint by the pelvi-femoral and the pelvi-trochanteric group of muscles. These muscles act satisfactorily, if the point d'appui is satisfactory. Any alteration in this point of support affects the muscles which support the hip joint and must result in mechanical disadvantage. This is evident in cases of dislocation due to congenital, pathological, or traumatic causes, and also in cases where the neck of the femur is fractured or altered as in the case of coxa vara, or in the peculiar type of infective arthritis of infants where the head and neck become absorbed. The consequent disabilities are peculiar to each type of condition, viz, the mechanical disadvantage of the pelvitrochanteric group of muscles which follows, as a result of alteration in the point of support.

Congenital dislocations of the hip joint are not common in South India. From a study of a large number of hip conditions in infants, it is found to be remarkably rare. In this condition the child's stability is impaired by the want of a fulcrum, as a result of the displaced position of the head, with the associated changes in head, neck, acetabulum, and muscular support. In old-standing dislocations, changes occur in the head, acetabulum, and the muscles, altering the line of pull of these muscles. It is more serious in cases of pathological conditions where, added to the acute inflammation, there is an added dislocation. This type of dislocation occurs in children between the ages of 6 and 8 years, who are usually brought to hospital with well-established deformity. The involvement of the joint supervenes on some intercurrent infection, such as pneumonia, dysentery or typhoid fever, when after a slight accident the child develops high fever with high fever with pain and swelling, resulting in an abscess which is drained outside. In my series the coursely be desired for the course of the course the cause of the infection has been typhoid fever in one of the infection has been typhoid fever. in one, dislocation in a student aged 20 years,

and smallpox in four cases. In the case of smallpox, the infection usually starts during the pustular stage, as a focus at the metaphyseal end of the bone, and when the metaphysis is intracapsular, as in the case of the hip, infective arthritis naturally follows.

One case of acute suppurative arthritis associated with jaundice and pathological dislocation due to tonsillar infection was admitted, and on examination was found to suffer from right heart failure. The child was transferred to the medical side where he died

medical side where he died. In old ununited fractures of neck of femur, similar problems confront the surgeon. In this case the disability is due to the break in the continuity of the point of support, and the mechanical disability that results is almost identical with that met with in an unreduced dislocation though the deformity is not so severe. Sixty per cent of these cases are poor risks on account of diabetes, renal disease, and myocarditis. One other peculiar condition deserves special mention. Several children in South India early in their infancy develop an infection of the hip joint with formation of an abscess, which points in the thigh, and after drainage of the abscess the child's condition improves. But the assumption of the erect posture and locomotion is remarkably delayed, and when the child begins to walk the gait is peculiar, resembling a congenital dislocation of the hip for which it is often mistaken. A study of a large number of such cases has convinced the author that the infection of the hip joint is due to a low-grade staphylococcus. In two cases the epiphysis of the head of the femur has been found to travel down the thigh with the abscess, as a sequestrum. A follow-up of these cases shows a gradual absorption of the head and the neck with displacement of the trochanter on to the dorsum ilii, resulting in considerable shortening of the limb. Sixteen such cases are on record and only three cases consented to submit to operative treatment. Infective arthritis or osteo-arthritis of adults are associated with pain disability and diminution in range of movement of the hip. As a result of changes which occur in the acetabulum, in the head of the femur, and in certain cases in the neck of the femur, the point of support is altered. Normally almost half of the articular surface of the head of the femur is in contact with the socket at any angle, and if this relationship is altered by the widening and the irregularity of the head of the femur, or alteration in the angle of the neck, more pressure will be borne on a restricted area with consequent alterations of the acetabulum and the head, and the development of osteo-arthritis in

The treatment of these conditions is a real problem and the aim of the treatment must be the restoration of the stability of the hip joint and if possible of its movements also. Various operations have been devised to overcome the disabilities that arise from the above-mentioned

the joint.

conditions. Reconstruction of hip joint in cases of old fractures of neck of femur, arthroplasty of the hip joint, pseudo-arthrosis or arthrodesis of the hip joint in cases of osteo-arthritis or infective arthritis, with several modifications, have been devised to improve the functional range and stability of the hip joint. None of the above-mentioned operations can be universally employed in all conditions of hip joint disabilities. Each operation has its own limited scope of usefulness. There is another factor that has to be seriously considered, apart from the technical skill of the surgeon employing these different methods, viz, the physical condition of the patient to withstand any very severe operation. It is more important to consider this aspect in South India, where the standard of resistance of the individual is low because of the lack of dietary essentials necessary to build up the reserve to withstand any serious surgical interference.

Lorenz bifurcation which was devised by Lorenz in 1919 for the treatment of the old unreduced congenital dislocations of the hip is a simple but effective method of treatment, and can be applied with modifications in all cases where stability of the hip is desired. The object of this operation is to provide a proper support to the pelvis so that the pelvi-trochanteric group of muscles can work at a mechanical advantage. It has been the experience of the author, where this operation was done in a variety of cases, that it not only provided a support for the pelvis but also improved the range of movement. This became evident after the follow-up of these cases, the pictures illustrate the usefulness of this operation

this operation. The principle of this operation is to do an oblique osteotomy in such a way as to get the proximal end of the distal fragment towards the lower margin of the acetabular rim and allow the upper fragment to slide down so as to make the two fragments unite at an angle serving a double purpose: (1) affording the proper point d'appui for the pelvi-trochanteric group of muscles to act; (2) giving a lower insertion to the glutei (part of pelvi-trochanteric group) so that they can work at greater advantage. If this point in the technique of operation is not observed, the result will be unsatisfactory. This operation has been employed in one case of congenital dislocation (?—doubtful history). The parents of the child gave a history of a fall so slight that it was unlikely that the fall caused the dislocation. There were no inflammatory changes around the joint. The gait and shortening and the clinical symptoms were those of a long-standing dislocation. Hence this case is classified as a congenital dislocation. (It is often the experience when parents bring children they give very short duration just to impress upon the doctor the acuteness of the condition with the hope that it will be easily cured.) Oblique osteotomy was also done in seven cases of old ununited fractures of neck of femur, in

two cases of pathological dislocations of the hip in three cases of osteo-arthritis of the hip without hip

Case 14.

Fig. A1 is a tracing of the radiographic picture showing a dislocation of the hip with absorption of head and part of the neck of the femur, an example of Smith's arthritis of infants showing the late effects.

ed shortening.
The Trendelenburg test
becomes negative after the

Fig. A2 is a tracing of the radiographic picture showing the position of the fragments after union after an oblique osteotomy.

Figs. A3 and A4 are the tracings of the clinical photographs taken one year after the operation showing the In ol range of movement that was possible after the operation. Note the tailor's position that could be easily obtained after the oblique osteotomy.

without dislocation in three cases of late deformities resultfrom ing Smith's arthritis of infants. In congenital dislocation (case 16) and Smith's arthritis of infants (cases 13, 14 and 15) the stability and the movements improve even though there is marked shortening. The Trendelenburg tive after the operation with i m p rovement in gait (see figures A1, A2, and A4). old unfractures of the neck of femur (cases 1 to 7),

patients who complained of great pain and inability to walk long distances, with limited and painful movement of the hip joint

Case 6.

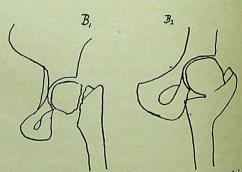


Fig. B1 is a tracing of the radiographic picture showing an old ununited fracture of the cervical part of the neck of the femur.

Fig. B2 is a tracing of the radiographic picture showing the position of the fragments after fusion after an oblique osteotomy. Note the fusion of the neck with the trochanter.

before operation, improved remarkably there operation (see figures B1, B2, B3 and B4). It is, however, a definite slight shortening.

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MAY, 1940] osteo-arthritis (cases 10, 11, 12) the pain which is great, associated with development of osteo-

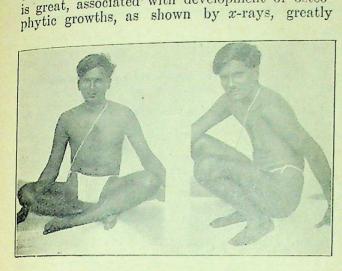


Fig. B3. Fig. B4. Figs. B3 and B4 show the range of movement at the hip, result of this operation.

improve in their physical well-being, gait, stability, and movement after this operation with absorption of osteophytic growths (see figures D1, D2, D3 and D4). In pathological dislocations (cases 8 and 9), which are so common in children

Case 8.



Fig. C1. Figs. C1 and C2 are the two clinical photographs showing the condition of the hip joint.

in India as a result of varied intercurrent infections, this operation, where it has been employed, has given entire satisfaction (see figures C1, C2,

This operation is simple and quick in its execution with very little shock to the patient and the results that are shown by the figures in this paper indicate the scope and usefulness of this operation in hip joint surgery. Fusion of the

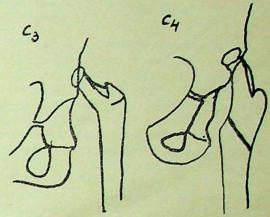


Fig. C3 is a tracing of the radiographic picture showing the pathological dislocation of the hip with osteophytic changes.

Fig. C4 is a tracing of the radiographic picture showing the position of the fragments after union after an oblique osteotomy.

hip joint has a limited scope and the results of arthroplasty are not so encouraging because the best result the author has seen in arthroplasty is a fixed hip joint. Indians who are in the habit



Fig. C5. Fig. C5 is the clinical photograph taken one year after operation showing the range of movement at the hip.

of sitting on the floor in the usual tailor's position do not tolerate a fixed hip. Most of the poorer classes feel it a great hardship to have a fixed hip.

The follow-up of cases of oblique osteotomy has convinced the author about the usefulness Statement showing the type of conditions where Lorenz bifurcation was employed and the results

				esults
Serial number	Sex and age	Occupation	Condition before operation	Result after operation
1	F., 50			Not known. At the time of discharge firm union with a real shortening of 1 inch. Operation in 1921
2	M., 64	Pensioner	A real shortening of 1½ inches, result of old ununited fracture neck of femur. Duration 4 months.	A real shortening of 1½ inches. Good movements at the hip. Patient can squat on the floor in tailor's fashion and can walk long distances. Followed for 6 years. Openities.
3	F., 40		A real shortening of ½ inch due to an old ununited fracture neck of femur. Duration 6 months.	Not known.
4	F., 50		A real shortening of 1 inch, result of old ununited fracture of the neck of the femur. Duration 4 months.	A real shortening of 1½ inches. Patient's stability and movements good. Has been followed for 3 years.
5	M., 40	Sanyasi	A real shortening of 13 inches, result of old ununited fracture of neck of femur of 7 years' duration.	Stability and gait and movements at the hip very good; can sit in tailor's fashion.
6	M., 25	Tailor	A real shortening of 1 inch, result of old ununited fracture of neck of femur of 6 months' duration.	A real shortening of 1½ inches.  Movements at the hip very good.  Has been followed for 2 years.  Figures B1, B2, B3 and B4.
7	M., 50	Coolie	A real shortening of 1 inch, result of old ununited fracture of neck of femur of 6 months' duration.	Done in 1938. Result is being watched.
8	F., 9		Pathological dislocation of the hip due to infective arthritis with a real shortening of 1 inch, duration 1 year.	A real shortening of 1½ inches compensated by a raised sole. Movements at the hip satisfactory. Case done in 1937. Progress satisfactory. Figures C1, C2, C3, C4 and C5.
9	F., 7		Pathological dislocation of left hip with a real shortening of 1½ inches. Duration 6 months.	Done in 1938. The child's movements at the hip were remarkably good after the operation before
10	M., 14	Student	Arthritis of the hip without dislocation with marked adduction deformity and 4 inch shortening. Duration 1 year.	Very good range of hip movements Patient can squat in Indian style without pain and has been followed
11	M., 30	Agriculturist	Osteo-arthritis of the hip with marked pain and limitation of movements.  Duration 3 months.	able to do agriculturist's work. Followed for 5 years. Figure
12	M., 25	Coolie	Arthritis of hip with marked flexion deformity at the hip. Duration 1 year.	Range of movements distributed improved. Patient is able to sit and bend his hip though he cannot
13	M., 11	Student	Arthritis of infants early in life with absorption of head and neck of femur. A real shortening of 2½ inches since childhood.	Range of movements definite improved. The tired feeling the boy used to have before operation disappeared and he can run and kick a football. Real shortening is 3 inches which was compensated by a raised sole of the boot.
14	M., 8	Student	Arthritis of infants resulting in absorption of head and neck of femur with a real shortening of 1½ inches since childhood.	Very good movements at the marked stability, no pain, A real and kick a football, shortening of 2 inches which was compensated by a raised sole of the shoe. Followed for A today.
15	M., 26	Beggar	Arthritis of infants with marked shortening of 2 inches since child-hood.	Stability and movement to supering improved. Patient able to improved. Patient able to improve in Indian fashion.
16	M., 5	Student	Dislocation of hip. Difficult to say whether it is congenital or traumatic. Three closed reductions were tried before operation without any success. Lorenz bifurcation was done.	Result is being watered the has been received to written. Done in 1937.

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of this operation with regard to the convenience which it affords to the common Indian patient in his normal daily habits, apart from the stability of the hip, and hence it is advocated.

Case 11.

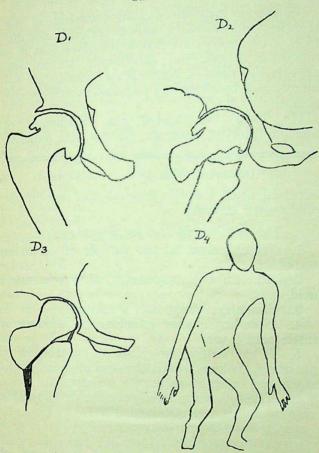


Fig. D1 is a tracing of the radiographic picture of the hip joint showing changes in the head, acetabulum, neck with formation of osteophytes on the acetabular rim and around the head of the femur.

Fig. D2 is a tracing of the radiographic picture showing the position of the fragments after an oblique osteotomy.

Fig. D3 is a tracing of the radiographic picture taken 6 months after operation showing the fusion of the fragments after an osteotomy, and note the disappearance of the osteophytes from the head of the femur and the acetabular margin.

Fig. D4 is a tracing of the clinical picture taken before discharge from hospital. Note the range of movement that was possible at the time of discharge. He subsequently has written saying that his range of movement has considerably increased and he can squat down though not actually able to assume a tailor's position while sitting.

My grateful thanks are due to Mr. T. P. McMurray, Director of Orthopædics, Liverpool University, who gave the author of this article an insight into the usefulness of this operation, while a post-graduate student in Orthopædics in Liverpool. My grateful thanks are also due to Dr. P. Kesavaswami, the Radiologist of King George Hospital, for his help in the reproduction of the photographs.

(Continued at foot of next column) .

#### AN OUTBREAK OF EPIDEMIC DROPSY

By R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S. (Retd.)

C. L. PASRICHA

MAJOR, I.M.S.

and

#### K. BANERJEE

(From the School of Tropical Medicine, Calcutta)

CHOPRA et al. (1939) showed, by a controlled feeding experiment in man, that argemone oil (expressed from the seeds of a weed Argemone mexicana) produces symptoms resembling those of epidemic dropsy. In this experiment five individuals, who ate food cooked in mustard oil containing known quantities of argemone oil, developed well-marked ædema and two of them showed the characteristic flushed appearance of the skin and had cardiac involvement (dilatation and murmur). It is interesting to recall that Sarkar (1926) first implicated argemone oil in an outbreak of epidemic dropsy in Malda district. Kamath (1928) described an outbreak in Ganjam district in which oil pressed from certain seeds (locally known as 'odissimari' seeds) was popularly believed to be responsible for the outbreaks of the disease. Samples of odissimari' seeds were obtained and identified as the seeds of Argemone mexicana. Kamath, in discussing the various theories, wrote 'Another idea gaining ground among the villagers is that the disease is due to some poison in adulterated gingelly" oil. They allege that "gingelly" seeds are mixed with seeds of an agency plant called in Oriva "odissimari" and that the oil from the latter seeds is poisonous. In support of this theory, they state that the pure oil of these seeds when applied to the body produces erythema and local swelling, and that, if internally administered, it is certain to produce the disease. Enquiries made from those who extract the oil bear out this statement'. It is unfortunate that these two reports were neglected and forgotten till the recent work of Lal and his collaborators (1939), who produced more extensive epidemiological data incriminating

#### (Continued from previous column)

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mustard oil in the ætiology of epidemic dropsy.

Pasricha et al. (1939) in a study of an outbreak of epidemic dropsy in a closed community deduced further evidence implicating the oil of Argemone mexicana. Recently, an opportunity occurred of studying an outbreak of epidemic dropsy in an institution where there are two groups of individuals of which one group was affected and the other escaped. As there were certain interesting features in this outbreak, a short account of it is recorded.

The group in which the outbreak occurred consisted of 27 adult women and the other group which escaped consisted of about 100 persons of all ages, the majority being adults. There were separate kitchens for the two groups, but the food supplied for use in the two kitchens was from the same source except for the mustard oil which was obtained from two different sources. Samples of mustard oil available in the kitchen of the affected group were found to contain approximately 3 to 5 per cent argemone oil whereas samples of oil collected from the other kitchen were free from argemone oil. The rice used in the two kitchens was from the same source and was of the parboiled medium-grained

variety without any opacities.

The first case of epidemic dropsy was noted on the 25th August, 1939, and an examination carried out four days later showed 15 or 56 per cent of the 27 persons in this group were suffering from epidemic dropsy. There was a history of fatigue and palpitation in some, which was attributed at first to the strain of work and the oppressive weather then existing. In 7 of the 15 persons affected there was a history of diarrhea with 4 to 5 stools a day and lasting for 1 to 3 days. One of the affected persons had noticed blood and mucus in the stools. Five of the 15 developed severe symptoms and required admission to hospital, one later developed a large pedunculated sarcoid on the back of the right forearm and one ran a low continuous fever for 10 days. In one patient there was markedly increased tension of the eye but without any changes in the fundus.

As soon as the outbreak was recognized, the use of mustard oil was stopped and no further

cases occurred.

#### Summary

An outbreak of epidemic dropsy is described. In this outbreak in one group 15, or 56 per cent of 27 persons, were affected, whereas in a larger control group of about 100 individuals there

were no cases of epidemic dropsy.

The diet in the two groups was similar except that the mustard oil supplied to the two groups was from different sources. The mustard oil used for the cooking of the food for the group in which the outbreak occurred was found to contain approximately 3 to 5 per cent argemone oil, whereas the mustard oil used for the other group was free from argemone oil. No fresh cases

(Continued at foot of next column)

#### OBSERVATIONS ON AMŒBIASIS AND ITS TREATMENT

By MAX MAYER, M.D.

(From the Prince Bijey Singhi Memorial Hospital for

AMCEBIASIS still offers many pathological and therapeutical problems; this is certainly not due to lack of observation but to the fact that it is a protean disease par excellence. Its importance is not always appreciated, because of the many cases in which the parasite causes obscure symptoms.

We have investigated the frequency of amedic infection amongst our hospital patients.

(Continued from previous column)

occurred after the stoppage of the use of the adulterated mustard oil.

The nitric acid test for argemone oil

- Take 2 c.cm. of the sample of oil to be tested.
- 2. Add an equal quantity of strong nitric acid.

3. Shake for about half a minute.

4. Note any change in colour in the lower or nitric acid layer.

5. If the bottom layer shows a brownish to an orange colour regard the specimen as suspicious and reject it as unsafe for use.

6. The following table gives the details of the

results of this test obtained with-

(a) pure mustard oil,

(b) pure argemone oil, and

(c) mustard oil containing 5 per cent of argemone oil.

	Pure mustard oil	Pure argemone oil	Mustard oil containing 5 per cent argemone oil
Upper layer or the oil layer.	Slight change in colour.	Change in colour.	Slight change in colour.
Lower layer or the acid layer.	Colourless. No change in colour.	Orange red to brownish red.	Brownish tinge to orange red.

Note.—False positive reactions may be given by certain other adulterant oils such as 'sesame

oil', 'ground nut oil', etc.
It is better to reject any oil giving even suspicious reactions.

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Routine examinations of the stools are done in every case admitted in the medical wards. Our observations extend over a period of 12 consecutive months, thus differences owing to seasonal incidence are avoided.

Entamæba histolytica was present in 23.2 per cent of the patients examined. This figure is obtained from the findings in 1,083 examinations. It includes the incidence of amæbic cysts and vegetative forms, the latter having been present in 6.5 per cent of the stools (28 per cent of the infections). Other characteristics of the infection are mucus, blood in macroscopic and microscopic quantities, pus cells, undigested food, and Charcot's crystals. They occurred in 7.7 per cent of the stools (33 per cent of the infections), concurrently with cysts, either alone or with vegetative forms of Entamæba histolytica.

Mucus, blood and pus cells were found also in 8.1 per cent of all stools examined in which Entamæba histolytica was not present. This group represents mostly the bacillary dysenteries and such conditions as non-specific enteritis, colitis, and related affections. In some instances Entamæba histolytica may have been responsible, as judged from the clinical development of the case. It is known that in a certain number of cases amæbæ may never be seen in the stools. These doubtful cases have been excluded from our statistics.

Actually, only 6.8 per cent of all patients whose stools were examined complained of intestinal symptoms possibly referable to amobic infection. Of these, 1.7 per cent had no amœbæ in their stools but suffered from different diseases. Thus, only 5.1 per cent of all patients, i.e., 22 per cent of the patients with positive infection, were clinically suffering from it. This figure is even lower than that of the combined findings of amæbic cysts and vegetative forms simultaneously (28 per cent of the infections).

Quite a number of the patients with clinical symptoms of amæbic dysentery showed only cysts in the stools; but in many cases cystic and vegetative forms of the parasite were present without causing clinical symptoms. The destructive processes of the intestinal walls remain here clinically silent, in spite of blood, mucus and pus cells appearing in the stools. Eleven per cent of our patients with amœbiasis belonged to this group.

Amebiasis plays a part that we have learned to consider carefully in the treatment of the different diseases, in which these protozoa, though not the primary cause of the illness, may well influence the course of it by interfering with the natural tendency to recovery.

We observed this phenomenon in two cases of pulmonary tuberculosis in which diffuse abdomined inal pain, diarrhœa, mucus, blood and pus cells in the stools seemed to indicate tuberculous lesions of the intestine, especially because on the first two stool examinations no parasites Were seen. Careful search for acid-fast bacilli

did not lead to their detection, making the interpretation of the symptoms more difficult. The patients' condition was already very low when eventually amœbæ were found in cystic and vegetative forms. Energetic anti-amebic treatment was followed almost immediately by marked improvement of the clinical picture, and only since then have the therapeutic measures against the tuberculous lesions in the lungs begun to be effective.

Similar instances occur in many other diseases complicated by amediasis, particularly the anæmias of the so-called primary type with nutritional disturbances. It is suggested that the amœbic infection leads to deficient absorption from the intestine and is therefore an obstacle too big to be overcome by therapeutic measures directed to re-establish the normal function of the hæmatopoietic system only.

Thus, the prognosis of a disease may become dependent on a concurrent amæbic infection. Consequently we treat energetically every case of amœbiasis, whether it is a manifest or a silent one, and do not discriminate in principle between carriers\* of cysts only and those of both cysts and vegetative forms.

After the intestine, the liver is the organ which suffers most from amæbiasis. Enlargement of the liver is one of the common features in amæbic infection, and must not be looked upon as a complication, as long as no invasion by the parasite has taken place; this is an entirely different condition. Hepatomegaly in amœbiasis indicates changes of the liver cells, as such. Although there is no unanimity of opinion regarding the cause, probably products of the metabolism of the parasite, as well as faulty absorption of food and increased virulence of the intestinal flora, all play a part in the phenomenon.

Hepatic dysfunction is always an important factor, but more so in India where the great majority of patients attending a hospital suffer from some deficiency.

Low grade hepatitis is an extremely protean condition: slight enlargement of the organ, a sensation of heaviness in the epigastrium, subfebrile temperature, and sometimes moderate

\*The term carrier should only be used to indicate a person who is unaffected by the presence, in or on his body, of a virulent infectious organism.

Knowing that in amebiasis anatomo-pathological

lesions are always present, although no clinical symptoms may arise for some time, carriers really do not exist. Therefore this term should not be adopted in connection with amæbic infection.

connection with amobic infection.

[Whilst we welcome the emphasis that the writer has given to this fact, we must point out that this has been the teaching at the Calcutta School of Tropical Medicine for nearly twenty years. The expression 'cyst passer' has been recommended in preference to 'amoebic (or hystolytica) carrier'. The expression 'cyst carrier' is doubly wrong, as cysts are only indications of the presence of active amœbæ, if the writer appreciated this point, he has certainly not emphasized it.—Editor, I. M. G.1

jaundice are the only signs. Their interpreta-. tion undoubtedly offers certain difficulties. Far too often a diagnosis is ready which means nothing in itself, but is satisfactory in producing a soothing effect on the patients mind. 'Sluggish liver' is neither a scientific term, nor does it exist from a pathological point of view. The underlying condition causing the aforementioned symptoms is always a clinical entity which can and must be properly diagnosed. Amebic infection is many times responsible but is rarely thought of in this connection, because unfortunately the term 'amæbic dysentery' has produced some confusion. Amæbiasis in its subchronic and chronic stage is accompanied in the majority of cases by constipation and not by diarrhea. With this fact in his memory the possibility of amæbic infection should not escape the physician's attention.

On the other hand, short periods of diarrhea under these conditions are frequently classed as acute indigestion. At a later stage they may be labelled 'colitis'. Symptomatic treatment is then induced, which may be temporarily successful in suppressing the symptoms. If they reappear, as they are bound to do, the former diagnosis seems even more justified. It is obvious what harm will be done. By simple examination of the stools the patients would have been saved from indefinite periods of physical and nervous incapacity.

Involvement of the liver due to amedic infection was found in 32 per cent of the cases. Moderate increase in size and slight hardening and tenderness of the liver were the main symptoms. Bile pigments in the urine were found in seven cases (9.6 per cent), bilirubin in four cases (6 per cent), and the liver function test (Takata-Ara) gave positive results in 11 cases (12 per cent). The van den Bergh reaction was positive in four cases (6 per cent).

In the tropics, impairment of the liver function seems to have even more importance; here cirrhotic liver changes, especially of the atrophic type with portal cirrhosis, reach high proportions. If such causes as malaria, syphilis and chronic alcoholism can be excluded the problem arises whether or not a number of these cases may be due to the continuous damage which this organ suffers from chronic amœbic infection. Research on this line would prove very useful.

#### Treatment

As far as treatment is concerned we have emphasized that in the first place every positive case of amœbiasis should receive treatment. The choice of the drug varies with the case. Treatment is guided by the natural advice that the measures employed must not do the patient further harm. This leads necessarily to the exclusion of drugs apt to affect organs already endangered by the infection.

Some recent arsenical preparations exert decidedly ill-effects on the liver, a fact which is the more deplorable as these drugs are powerful

amedicides. Their use has to be limited to cases which resist other therapeutic efforts\*

Emetine for the same reason can be used only in comparatively small doses. Higher dosage, which might result in a complete eradication of the infection, cannot be administered because of the toxicity of the drug. It has, however, an uncontested advantage over all anti-amedic remedies in amedic liver abscess and the rare complications affecting lungs, brain and spleen.

Searching for an anti-amæbic treatment which has no undesirable side-effects, but which is, on the other hand, at least as effective as the arsenicals or emetine, we investigated the therapeutic value of an iodochloroxychinolin compound with addition of sapamin (Enterovioform, Ciba). Sapamin is said to increase the emulsification of the active principle. The drug has been developed because of the amæbicidal properties in vitro of vioform, which is used as a powder in skin lesions and surgical conditions, and has decidedly antiseptic qualities.

The first group of patients with gastro-intestinal symptoms related to infection with Entamæba histolytica consisted of those with both cystic and vegetative forms in their stools, who were thus classified as suffering from acute or sub-acute amæbic dysentery. The clinical symptoms did not differ from the classical descriptions sufficiently to justify a lengthy enumeration.

After an initial saline purge, 15 patients were given two tablets of enterovioform (0.25 gramme) thrice daily, on a full stomach, for a period of ten days. Clinical symptoms disappeared after an average of three days and no amæbæ could be found in the stools after an average of five days. To three cases with diarrhea and tenesmus (30 to 36 stools in 24 hours), enemata made of two or three tablets of enterovioform in normal saline were given in addition to the oral treatment. Almost immediate relief from the intestinal spasms was effected. The enemata were discontinued as soon as the frequency of the stools returned to a reasonable level. One case resisted this form of treatment for several days and needed large doses of opium and bismuth.

Four of the 15 patients have been observed for only 20 days after the treatment was completed. No amæbæ occurred in the stools during this time. Eleven cases were followed up to an average of six weeks and regular weekly stool examinations were made after a saline purge had been given. In no instances were amæbæ found, the longest period of observation having been four months. This result enables us to state that a complete cure was obtained.

Some patients continued to have slight epigastric tric pain and occasional loose stools.

<sup>\*</sup>We do not think that this can be applied to all the arsenicals used in the treatment of amorbiasis Editor, I. M. G.

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analysis revealed, in all but one case, marked hypochlorhydria. Adequate treatment of this condition led to complete freedom from symptoms.

The second group of patients had only amebic cysts in their stools but suffered from gastro-intestinal symptoms for which the parasite was held responsible. These cases represent the sub-chronic and chronic clinically active amebiasis. Most of the patients sought admission to the hospital for other than the troubles actually connected with the amebic infection. In many cases the routine examination of the faces revealed the parasite as a purely accidental finding. Nevertheless, appear in this group, only patients whose gastro-intestinal symptoms were definitely due to the activity of Entamæba histolytica.

Enterovioform was administered in the same way as above. In an average of five days the condition cleared up and abdominal discomfort ceased. In follow-up examinations extended over an average of five weeks, 11 cases were freed from the parasite and two remained positive. In these cases emetine (1 gr. daily for ten days) was injected. One case was thereafter cured, but in the other, cysts continued to be present in the stools, although for the time being no symptoms of the infection reappeared.

Thus, enterovioform proved to be effective in 86 per cent of the cases in this group, a result which conforms to the percentage of cures seen in any other energetic and complete treatment.

The third group was that of 18 cases of amedic infection with cysts only, without any appreciable symptoms related to the infection. The doses of enterovioform given were identical to those of the preceding groups. Sixteen cases showed afterwards no amedie in their stools during the period of observation of an average of four and one-half weeks after this treatment. In two cases the cysts were perhaps reduced in number, they were not found at each weekly examination, but they did not disappear completely.

As in these silent infections, the work of destroying the parasites is that of the drug alone, whilst the organism probably takes little or no part in the fight against the parasite, the result of the treatment as shown by absence of amebæ, even over a prolonged period, must be critically interpreted, because amebæ may not show themselves for a considerable time. The absence of amebæ in 83 per cent of the patients after a ten days' course of enterovioform is nevertheless a very satisfactory result.

For practical purposes, in order to obtain quicker and safer results, one may give in chronic asymptomatic amebiasis a combined treatment of emetine and enterovioform. It has the advantage of shortening the course of treatment. Six daily injections of emetine (1 gr.), daily, over the same period have permanently

freed eight patients suffering from chronic amæbiasis from recurrence of the parasite in the stools. Neither of these drugs alone would be sufficient to yield a cure and it must be supposed that they each complete the action of the other.

#### Symptomatic treatment

In testing enteroviolorm we gave the drug to a number of patients not suffering from amobic infection in which symptoms such as diarrhoea, intestinal spasms and similar conditions were caused by different infections. We did not expect a cure, but at least a symptomatic relief.

Enterovioform proved to be anti-fermentative and anti-putrefactive in a small number of dyspeptic disorders. It relieved the tenesmus in enterocolitis to a great extent, especially if given in the form of an enema. In bacillary dysentery we gave enterovioform because it acted favourably on the common bacterial flora, preventing an increase of their virulence. However the total of these cases is as yet too small to be summed up statistically.

We feel that colitis is a definite indication for enterovioform treatment but it must not be used exclusively. The ætiology of colitis is not yet clear, and relapses may occur if the treatment is only directed against its symptoms, which often disappear with enterovioform. In recurrent colitis every effort must be made to detect the real cause. Symptomatic treatment as a rule is the last resource in recurrent intestinal disturbances.

#### Comment

The frequency of amœbiasis constitutes a definite therapeutic problem and is not only confined to the cases in which the disease manifests itself with the classical symptoms; equally important is the asymptomatic and clinically silent infection. We have seen in our hospital many cases of different diseases, such as tuberculosis of the lungs, anemias of different origin, and asthma with co-existent amœbic infections. After the above-outlined anti-amœbic treatment, these cases were followed rapidly by marked improvement of the patients' condition, previously not influenced by the original treatment.

There is no innocuous amœbiasis and no such thing as a 'healthy carrier'.

The possible consequences of long-standing infections with *Entamæba histolytica*, on the organism as a whole and on the liver in particular, are emphasized by the large number with hepatic dysfunction and demand that every case be adequately treated.

Treatment has to be planned in a way that exterminates the infection and does not harm the patient. Arsenical preparations are contraindicated except when other treatment fails. Emetine is the drug of choice in amœbic abscess of liver, lungs, brain and spleen. In all other conditions less toxic preparations are preferable.

Enterovioform (Ciba) has shown its ability to deal successfully with acute, sub-acute, chronic and sub-chronic infections. It is particularly useful in cases in which the whole process suggests a marked activity of the parasite, when although diarrhea may be absent, the parasite action is shown only by the stool examination, mucus, blood, pus cells, and undigested food being found. Such cases are best classified as 'sub-chronic ameebiasis'.

Under these conditions a cure may be expected in 85 per cent of all cases, after a ten days' course of enterovioform (Ciba), two

tablets (0.25 gm.) thrice daily.

In chronic infections of long standing, with or without clinical symptoms, a combined treatment of enterovioform and emetine for six days may be given.

No after- or side-effects have been observed with enterovioform, and no symptoms of iodism, even in susceptible patients in which other iodine compounds (potassium iodide) caused marked symptoms.

No incompatibility with any other kind of pharmaceutical preparations has been detected.

It is essential that check-up examinations of the stools be done one week after the treatment and again after three or four weeks, otherwise cases which resist the treatment will not be detected\*.

#### Summary

The incidence of amæbic infection in unselected patients composed almost equally of rural and urban elements was 23.2 per cent.

Of the infected cases, 30 per cent showed in one way or the other symptoms of acute or sub-acute processes.

In 32 per cent of the infections pathologic conditions of the liver, excluding liver abscess,

were found.

Enterovioform (Ciba) produced a cure in all cases of acute amæbic dysentery (15 cases), in 86 per cent of sub-chronic infections (11 of 13 patients) and in 83 per cent of chronic amæbiasis (16 of 18 patients), when given for ten days in a dose of two tablets (0.25 gm.) thrice daily, after meals.

The period of observation after the treatment was such as to allow definite conclusions.

Combined treatment by enterovioform and emetine over a period of six days is sufficient to deal with chronic asymptomatic amebiasis.

The author is indebted to Dr. R. J. Weingarten, M.D., P.M.O., Bikaner State, for his assistance and kindness in allowing data of this paper to be collected from this hospital, and also to Dr. S. D. Sahasrabudhe, M.B.B.S., Pathologist, for his assistance in connection with the laboratory work.

QUININE AND ATEBRIN IN THE CONTROL OF MALARIA; WITH SPECIAL EMPHASIS ON THE PRACTICAL AND ECONOMIC VIEWPOINTS

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#### 1. Object of the experiment

The primary object in administering the course of drugs prophylactically, as outlined in this paper, was to determine the method by which a given sum of money could be expended to give the greatest possible reduction in malaria incidence in a tea estate population at a definite period of the year—namely, when the demand for labour was at its greatest.

With this object in view as the primary consideration, the method was so arranged as to give as much information as possible as to the relative value of prophylactic administration of quinine and atebrin in reducing the incidence

of malaria in this population.

## 2. Data regarding the incidence of malaria on the estate

The estate chosen was Towkok, one of the Assam Company's gardens in the Sibsagar District of Assam. The population on the estate is resident in several groups. The largest group comprises 2,173 persons who are quartered in a clearing of 75 acres which is surrounded on three sides by tea land, and one side by grazing land and light jungle. These lines are known as the 'main lines'. There are three other groups of coolie lines situated some miles away, the largest of them being known as 'Namtolla lines' which are situated three miles distant on the boundary of the estate outside the tea land. The resident population here is 750 persons, and they live in a scattered village extending over some 260 acres.

Towkok estate has for many years had a notoriously high sick rate and malaria has been hyperendemic. In 1934, temporary biological control measures were instituted in the half mile circle surrounding the main line.

The expenditure on larvicides and sprayers

was as follows :-

The average annual cost including labour was about Rs. 1,400.

The terrain is of a hillocky nature; areas of high land, on which tea is grown, are separated

(Continued from previous column) cure after four consecutive negative findings is consound. Unless there is evidence that cysts were sistently present before treatment a dozen negative examinations scarcely indicate even a reduction of the infection.—Editor, I. M. G.

<sup>\*</sup>Few workers on the treatment of amœbiasis have provided statistically acceptable evidence of cure in the cases they report. To start treatment after a single observation of cysts in the stools and to proclaim a (Continued at foot of next column)

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is is not vere connegative negative on of the by a network of hullahs and natural streams. It is difficult—if not impossible—to improve the

drainage. Anopheles minimus is the most important vector and can be found breeding in over ten miles of hullahs, drains and streams within the half mile circle surrounding the main lines. Many of these areas could be shaded only by tall shade vegetation, such bamboo, but the policy of the management has been to clear bamboo from the edges of hullahs, as it gave an undesirable degree of shade and humidity to the neighbouring tea bushes, and furthermore it was considered that pests and blights spread from it into the tea.

The terrain is very similar at the Namtolla line but in addition to malariogenic hullahs

there are two large perennial streams winding through the village.

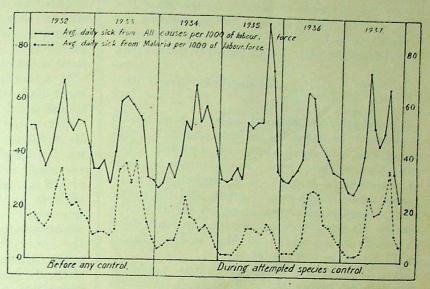
Figure 1 shows the average daily number per thousand of the labour force off work month by month, 1932–37, due to malaria and to sickness from all causes on the whole estate. From this it can be seen that the incidence of sickness from all causes and from malaria is low from November to May and high from June to October, the highest peak generally being in June and July, while a second peak may occur in October.

It also demonstrates that the institution of temporary biological control methods in the half mile surrounding the main line population in 1934, was associated with a decrease in malaria on the estate. Unfortunately, previous to 1934, there are no records of the cases from each line, so it is not possible to show the malaria rate in the main line population before and after introducing biological control. The average daily malaria and total sick rates in the whole labour force in the two years prior to any control and in the four years during which larvicides were applied at the main lines are as follows:—

	AVERAGE DAILY NUMBER OFF WORK PER 1,000		
	Due to all causes of sickness	Due to malaria	
Before any control,	47	19	
During partial control, 1934-37.	42	10	

Figure 2 shows the average daily number per thousand off work due to malaria from 1934-37 from the main line and the Namtolla line for

comparison and shows a slightly higher sick rate at Namtolla.



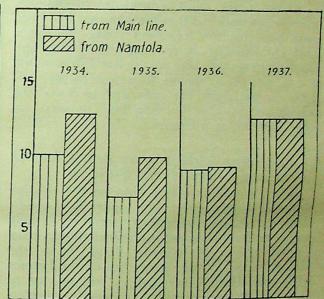


Fig. 2.—Showing average daily sick from malaria per 1,000.

The spleen rates were taken in March of 1934 and of 1938 and were as follows:—

		Main line	Namtolla line
Before any malaria control measures.	March 1934	57 (243 examined).	74 (136 examined).
After 4 years of control in main line.	March, 1938	50 (390 examined).	78 (175 examined).

Some degree of reduction was obtained as is shown by the fall in sickness and by the fall in spleen rates, but in view of the disappointing results and in view of the objections to covering the hullahs with shade vegetation, and the apparent impossibility of adequately controlling the breeding with an economic expenditure in

larvicides, it was decided to abandon biological control methods in 1938 and to attempt to reduce the incidence of malaria in the main line by a mass administration of drugs, limiting the expenditure to Rs. 1,400 the same sum spent, on an average, annually in the previous four years.

# 3. The factors determining the period of treatment

The greatest incidence of malaria, as is shown in figure 1, is generally in June and July, with sometimes a second peak in October. The period when the labour on the estate is most urgently needed is June to September, when the greatest part of the crop is made, and the maximum degree of efficiency is called for from the labour. It was, therefore, decided to start mass treatment in the middle of May and to stop it

in the latter part of September.

It was appreciated that treatment would be discontinued before the risk of fresh infection was past, and that there would in all probability be a rise in the malaria incidence in October, but it was considered that the sum that had been earmarked for the treatment could be spent most economically by reducing the number and intensity of attacks between June and September. It was decided to confine treatment to the residents in the main line only and to leave the population in the Namtolla line to serve in some measure as a control.

# 4. The factors determining the dosage selected and method of administration

An experiment to obtain data on the relative values of atebrin and quinine under field conditions was planned, the method being very largely based on the experiment in clinical prophylaxis, carried out in Malaya by Field, Niven and Hodgkin (1937) at the invitation of the League of Nations Health Organization, but, in view of the financial considerations imposed, considerable modification was necessary and the standard of the work as a scientific experiment falls very far short of the Malayan work. Field and his collaborators had divided a population into three groups, in which all factors influencing malaria incidence were as far as possible equal. The population of Towkok main line was divided into three groups, the division being so arranged that the houses of each group were evenly distributed over the area of the lines and as far as possible the same number of children and of recently recruited coolies were drafted into each group. The eastes were also, as far as possible, equally distributed between the three groups.

Field et al. (loc. cit.) in their experiment administered atebrin to one group, quinine to the second, and some neutral dummy tablets to the third, which served as a control group. The atebrin group were given by them 0.4 gramme of atebrin weekly, 0.2 gramme being administered on two successive days in each week, the quinine group were given 0.4 gramme quinine

hydrochloride, daily. Field (1937) in his preliminary paper suggested that 0.3 gramme in three tablets, might with advantage be given once weekly instead of the 0.4 gramme at two administrations; this would reduce the cost by 25 per cent and necessitate only one mass treatment weekly instead of two.

If with this modification the Malayan experiment had been repeated on Towkok and continued for the transmission season, it would have required 51,008 tablets of atebrin costing Rs. 2,791 and nearly 79 pounds of quinine, costing Rs. 2,047, a total of Rs. 4,838. Field, however, had also experimented with an adult dose of 0.2 gramme weekly and had reported that malaria 'continued amongst the adults with a numerical reduction in number of attacks of approximately 75 per cent as compared with the control'.

On these results it was considered that with a limited quantity of drugs a greater reduction in incidence and intensity of malaria attacks could be expected by administering the dose of 0.2 gramme weekly to adults and a proportionately reduced dose to children, than by administering 0.3 gramme or 0.4 gramme weekly to a smaller proportion of the population.

# Dosage selected

To group A atebrin was given as follows:— The course commenced with a 'blanket treatment' for five consecutive days.

Adults (over 12 years) were given 0.2 gramme daily. Children 5 to 12 years . 0.1 , , , , Children under 5 years . 0.05 , , ,

The 'blanket treatment' was to be followed by the same daily dose administered on one day in each week.

To group B it was decided to administer quinine on five consecutive days in every third week as follows:—

Adults (over 12 years) quinine bisulphate grain vi.

Children 5-12 years, quinine bisulphate grain iii.

Children under 5 years, quinine ethyl carbonate grain 12.

The quinine bisulphate was given in solution and the quinine ethyl carbonate for the young

children was given in milk.

This method of giving quinine for prophylaxis was chosen as in previously conducted field was chosen as in previously conducted field experiments I had satisfied myself that it was a practical method of economically reducing the number and intensity of attacks.

For group C a dose of infusion of quassia was available on one day in each week for any person who felt aggrieved at not receiving any course of medication.

# 5. Arrangements for administration and practical difficulties

Certain practical difficulties in administration had to be met. The labour is almost entirely

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illiterate and many of the coolies are very primitive. Whereas now-a-days there is not much difficulty in getting sick persons to attend hospitals for treatment in most tea estates in Assam, there is often considerable difficulty experienced in inducing healthy persons to attend and receive drugs for prophylactic purposes. The difficulty is accentuated at the present time in Assam, as it is the policy of the industry to abandon as far as possible any methods of coercion.

The object of the treatment was explained to the labour force, the sirdars were made responsible for seeing the coolies attended hospital on the right days. The estate manager and European staff gave every possible support to the experiment, and as often as possible a European member of the staff or myself was present at the administration.

The treatment was given at about 7 a.m., as the coolies left their houses to go to work. Some of them have tea and some a little cold rice before going to work, but many do not take food till the evening so in a number of instances the drugs were taken on an empty stomach. This was a disadvantage, but it was not considered practicable to administer the drugs after the evening meal.

There was little opposition to taking the atebrin tablets on account of the absence of any unpleasantness either on swallowing or subsequently, and also on account of the small amount of inconvenience and delay in having the treatment on one day only in each week. A high percentage took the dose regularly.

Much more difficulty was encountered from the quinine group. The coolies disliked the delay in getting to work for five consecutive days in the week. There were a good many complaints of dizziness and nausea. On account of coolies' dislike of quinine and to avoid the risk of them holding a tablet in their cheek and subsequently ejecting it, the quinine was given in solution and this of course, although reducing one difficulty, gave rise to another, as the taste of quinine is generally strongly disliked. Very considerable trouble was involved in inducing the coolies to attend the musters regularly and although every effort was made there were a good many defections.

At each muster the medical staff worked in two teams each team consisting of one man to call and mark the register, one to measure and administer the dose and one to give a following draught of water. As some 600-700 persons had to be treated at each muster a certain amount of waiting was unavoidable.

# 6. Method of recording

Separate registers were kept for each group, every individual's name being written in and the members of households being grouped together. The households were classified under the names of the sirdars who were responsible for them, so that the names of any absentees could readily be given to the sirdar and efforts made to bring them subsequently for their dose. Every dose taken was marked in the register so the number of doses taken or missed by every individual could readily be obtained.

In addition, index books were kept for each group showing the names of all persons attacked with malaria, the number and date of attacks and the number of days of treatment for each attack. The diagnosis of malaria attacks rested on the clinical diagnosis made by a capable and experienced assistant medical officer. Although there is doubtless a certain degree of error, I am satisfied that the error is small, and, for representing the relative number of attacks in different groups, the error is almost negligible. The number of new coolies arriving during the course of treatment was so small that it can be ignored.

# 7. Dates of starting and discontinuing course and numbers treated

Originally it was planned to commence the treatment in the second half of May and to discontinue in the middle of September.

The blanket treatment to group A was given in the week ending 21st May and treatment was continued once a week till the week ending 10th September. However, in view of the fact that there was every prospect of fairly extensive fresh infections in the latter part of September and furthermore as some atebrin was in hand owing to a fraction of the group not having attended at each treatment, it was decided to have one further muster in the week ending 25th Sep-

The first muster for the group B was held in the week ending 28th May and musters were held in every third week until the final course, in the week ending 1st October.

Group A. At the 'blanket treatment' the persons taking treatment were as follows:-

Full 5 days ... ... 611 persons 85 per ... 4 ... 71 ... 9 ... 1-3 ... ... 39 ... 6 ... 9 ... Untreated ... 15 ... 2 ... .. 611 persons 83 per cent. 736 persons

At the subsequent 17 treatments an average of 87 per cent of the group took the drug, the highest number receiving the dose at any muster being 94 per cent and the lowest at any muster being 74 per cent in one exceptionally bad week The number of persons in the group fluctuated only very slightly, the largest number in any week being 736 and the smallest 726. The total amount of atebrin used was  $22,673 \times 0.1$ gramme tablets.

Group B. The administration of quinine was done with much less co-operation from the coolies. The highest proportion of the group taking the full five days' course was 84 per cent at the first week of treatment and the lowest 24 per cent at the last week of treatment. On an average over the seven courses, 58 per cent took

the full five days and 75 per cent took four days or more, 25 per cent taking three days or less. The number of persons fluctuated only slightly, the highest number being 728 and the lowest 713. The total amount of quinine used was 73,560 grains.

The number of persons in Group C averaged

724.

### 8. Controls

It is almost impossible to arrange for perfect controls in a field experiment of this nature. The results obtained, however, by the treatment have been measured in the following ways:—

Firstly, the combined results in the main line population obtained by the exhibition of quinine and atebrin to two-thirds of the population, may be compared with the results by anti-larval measures, undertaken in the previous four years. This may be done by comparing the figures for sickness from all causes and from malaria in 1938 with the corresponding figures for 1934-37. These figures must be considered in the light of evidence regarding the relative number of malarial vectors in the 1938 transmission season and previously.

Secondly, the relationship of the malaria case rate in the Namtolla and main line populations during 1938 can be compared with the relationship of the 9 case rates in these two populations 1934–37. This again is not an altogether convincing method of estimating the value of the treatment, as, although the two populations are separated by only three miles and are subject to the same climatic conditions and a similar terrain, the conditions cannot be considered as

identical.

Thirdly, the number of cases of clinical malaria may be compared in the three groups A, B and C, in the main line population in 1938. For this estimation, the control is not altogether satisfactory, as, although the risk of fresh infection must have been equal for all three groups, it must be borne in mind that there is a fallacy in assuming that the malaria rate in group Cthe untreated group—represents the rate that would have been expected, if the whole population in the main line had been untreated. By administering anti-malarial drugs to two-thirds of the population the parasite rate, and with it the gametocyte rate, was reduced in the treated persons quite apart from any particular selective action of the drugs on gametocytes. The lowering of the gametocyte rate in any population must reduce the infectivity rate of the local vectors and hence reduce the risk of fresh infection in the whole community, both those who are receiving drugs and those who are not. This is supported by the fact, as will be shown later in this report, that, although there were approximately the same number of attacks of clinical malaria in each of the three groups, the incidence of clinical malaria in the population was nevertheless reduced. The fact that the infectivity rate of the local vector is reduced is much

more adequately demonstrated by Field et al who report that '... the administration of prophylactic drugs ... was associated with a substantial reduction in the sources of mosquito infection'. An analysis of a table given by these authors in appendix A of their report shows that, during a period of administration of drugs to two-thirds of the population of estate T, in 707 blood examinations from the control group 16.6 per cent showed gametocytes, in 798 examinations from the quinine group 88 per cent showed gametocytes, and in 901 examinations from the atebrin group 1.2 per cent showed gametocytes.

### 9. Results

(a) The average daily number of persons of work per thousand of the labour force in the main line due to all causes of sickness and due to malaria from 1934–38 is shown in graphic form in figure 3. These sick rates may be summarized as follows:—

	AVERAGE DAILY NUMBER OFF WORK DUE TO SICKNESS PER 1,000				
	Due to all causes	Due to malaria			
1934–37 1938	41.5 29.0	10 6			

The loss in work due to malaria in 1938 was substantially lower than in the previous four years when larvicidal methods had been used to control malaria. The figures of sick from all

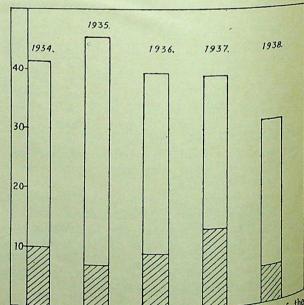


Fig. 3.—Showing average daily sick per 1,000 of the labour force from all causes of sickness and from malaria.

causes are shown, as, when the estimate of malaria incidence rests on clinical diagnosis, variation of the total sick rate corresponding to and greater than the variation in the malaria

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of the diagnosis.
Figure 4 shows the average daily malaria cases in the main line per thousand of the labour force, month by month, in 1934–37, in comparison with 1938. These figures may be conveniently

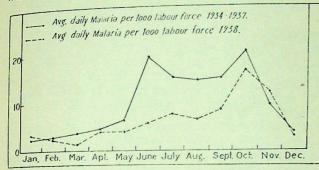


Fig. 4.

summarized, showing the average daily malaria per thousand during the period of treatment— June to September, and after treatment—October to December, with the corresponding average figures for the 1934–37.

		NUMBER PER K DAILY DUE TO LARIA
	June-Sept.	OctDec.
1934–37 1938	 16.0 7.1	13.9 11.5

It would appear, therefore, that, although the number of vectors feeding on the main line population in 1938 was at least as great in 1938 as in the previous four years, the amount of clinical malaria was considerably lower during the period when drugs were administered.

(b) The second method of estimating the results of the treatment is by comparison of the incidence of clinical malaria, in the main line and the Namtolla populations. The malaria rates in the two labour forces 1934-38 are shown in comparative form in figure 5. From

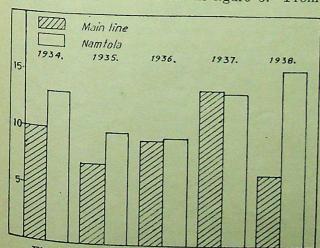


Fig. 5.—Average daily malaria per thousand.

this chart it can be seen that the relationship between the malaria rates in the two populations is not greatly dissimilar in any year in the series except in 1938. The spleen rates in the month of March preceding the drug administration and in March 1939 are as follows:—

				Main line	Namtolla
Spleen	rate,	March	1938	50 (390	78 (175 examined).
11	"	"	1939	examined). 38 (406 examined).	examined). 83 (109 examined).

From 1934-37 chart 5 shows that an increase in malaria in one population is associated with an increase in the other, the Namtolla population generally showing, as would be anticipated from the 1938 spleen rates, a higher proportion of cases. The rates may be summarized for comparison as follows:—

	AVERAGE DAIL 1,000 OFF WORK	Y NUMBER PER C DUE TO MALARIA		
	Namtolla	Main line		
1934–37 1938	11.25 15.0	10 6		

In 1938, there was thus a slight increase of malaria in the Namtolla population over the average for the past four years, whereas in the main line population, malaria was reduced by 40 per cent approximately, on the average, for the past four years. This would appear to support the view that the reduction of malaria in 1938 in the main line population was the direct result of the exhibition of drugs.

(c) The results obtained in the three groups A, B and C in the main line population are shown graphically in figures 6 and 7. Chart 6 shows the number of persons attacked with malaria in each group, week by week, from the week ending 22nd May, when the blanket treatment with atebrin was given to group A, until the end of the year. The figures shown in chart 7 may be conveniently summarized as follows:

	NUMBER OF CASES OF CLINICAL MALARIA			
	A	В	C	
During 20 weeks' treatment During 13 weeks after dis- continuing treatment.	77 * 127	111 105	151 77	
Total	204	216	228	

\*Of these 77 cases 25 occurred in the three weeks between 12th September and 1st October during which period only one treatment was given. Group A.

Group B.

Group C.

The number of persons attacked with clinical malaria was reduced in both the treated groups as compared with the untreated. So long as treatment was being administered there was

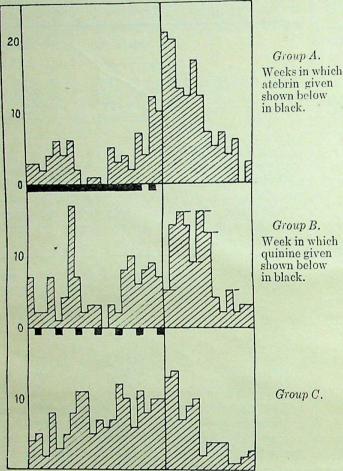


Fig. 6.—Showing new attacks of malaria each week in each group from commencement of treatment.

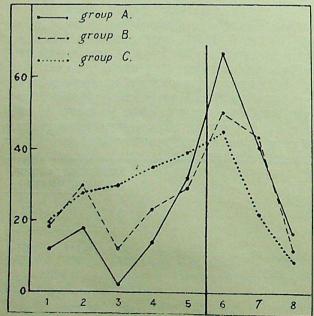


Fig. 7.—Showing new attacks of malaria in the three groups in the five periods of four weeks of treatment and the three periods of four weeks after discontinuing treatment.

actually a reduction of 49 per cent cases in the actually a reduction of the atebrin-treated group and a reduction of 26,5 per cent in the quinine-treated group, as compared with the untreated group, and the reduc-

tion would certainly have been greater in the atebrin group if two weeks' treatment had not been omitted in the month of September. This fact and the fact that only 84 per cent of the persons in the group on an average received the dose in any one week is sufficient to account for a lower reduction than that of 75 per cent, which was reported by Field in his experiment with the same adult dose.

As soon as the mass treatment of groups A and B was discontinued there was an increase in the number of cases from these two groups, the number of persons attacked being considerably greater than in the control group C. There was an increase of 65 per cent in the atebrin-treated group and an increase of 36 per cent in the quininetreated group as compared with the untreated group in the 13 weeks following the discontinuance of the mass treatment. The results are shown also graphically in chart 7 which represents the new cases of clinical malaria in each group in the five periods of four weeks, during which treatment was being given and the subsequent three periods of four weeks, when treatment had been discontinued.

# Conclusions on clinical prophylaxis

In this experiment it was not found possible to undertake extensive blood examinations. The nature of the results, however, so far as clinical cases are concerned, is very similar to those obtained

in the Malayan experiment where it was shown that during the period of mass administration the number of clinical cases was reduced in both treated groups, the greater reduction being in the case of the atebrin group, and that subsequent to discontinuing the mass treatment there was an increase of clinical malaria in the treated groups above the control group, the greater increase being in the case of the atebrin group.

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In the Malayan experiment it was shown that during the period of treatment, both the gross parasite rate and the gametocyte rate were reduced in the treated groups as compared with the untreated. An analysis of the figures given shows an hard, in this shows, as has been previously mentioned in this report that her previously mentioned in the report, that during the period of treatment whereas the untreated group has an average gametocyte rate of 16.6 per cent the gametocyte rate of the rate of the quinine and atebrin group, respectively, were reduced to 8.8 per cent and 1.2 per cent. Their forms of the subcent. Their figures further show that sub-sequent to discontinuous further show that sequent to discontinuing the treatment both gross parasite reterrore gross parasite rate and the gametocyte rate rose in the groups that I in the groups that have been treated, to figure 1940

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considerably greater than those in the untreated group.

It would seem reasonable, in view of the similar findings obtained in clinical cases in the Towkok experiment to those in the Malayan, to assume that similar changes in the gross parasite rate and the gametocyte rate occurred

in the population in this experiment.

The question that immediately presents itself from these facts is, why should the incidence of malaria in the treated groups be greater than in the untreated, in the post-treatment period? Field and his co-workers in their paper state 'it is to be concluded that the "sterilization value" both of atebrin and quinine is low when the drugs are given in doses and at intervals appropriate for prophylaxis'. They stated in their conclusion that they believed the 'post prophylaxis' malaria was due to the reappearance of infections which had been clinically, and in many cases parasitologically, 'hidden' by the prophylactic treatment. Do the results from the experiment at Towkok confirm this view? Attacks of clinical malaria in this population between mid-May and the end of the year may have resulted from infections occurring either at some time previous to treatment, or during the period of treatment, or in the post-treatment period. In each group there had been at any time equal risk of infection. Of the cases of clinical malaria which occurred in the unprotected group between mid-May and December, some of these were undoubtedly the result of infection prior to May. Opinion is divided as to what proportion of cases recrudesce in the year following infection, but it is generally accepted that a substantial proportion of cases that receive only a few days' treatment in an attack, as is the case with tea estate labour, will relapse in the following year. Group A, however, had been given a blanket treatment with atebrin in mid-May for 5 consecutive days with a view to sterilizing the blood of this group and actually 83 per cent had received the full treatment and 92 per cent had received 4 or 5 days. This being so, it seems reasonable to suppose that, if a blanket treatment with the dose administered is successful-at any rate in a proportion of cases-in sterilizing the blood, at the end of May a smaller number of persons would have parasites in their blood and be liable to recrudesce in group A than in group C, yet between mid-May and the end of the year there were 204 cases of clinical malaria in group A and 228 in group C. This fact would seem to suggest that the post-treatment increase of malaria in the atebrin group was caused not only by infections that had occurred and been kept latent during treatment becoming manifest when treatment was discontinued, but also that the treatment had actually reduced the natural resistance allowing a higher proportion of infections subsequent to mid-May to become manifest in clinical malaria in group A than in group C. The alternatives to this to this supposition would appear to be that

either no more than 10 per cent of the cases occurring in group C between mid-May and December were attributable to infection contracted before mid-May, or that the blanket treatment almost completely failed to effect sterilization of group A. Both these alternatives seem rather improbable.

An analysis of the results of this course of treatment would appear to suggest strongly that although the evidence is inconclusive, the benefits effected in reduced incidence of malaria in this population living in an area where biological control presents special difficulties, by the expenditure on clinical prophylaxis in the manner in which it was administered were greater than those effected by expenditure of the same sum on temporary biological control.

The results also make it evident that the malaria incidence at any particular period in the transmission season can be more readily controlled by clinical prophylaxis than by biological

Militating against these advantages is the fact that very much greater difficulties are encountered, due to unpopularity of prophylactic treatment, with an illiterate labour force and much more supervision is necessary to insure success of clinical prophylaxis than in biological control.

In considering the relative merits of atebrin and quinine in the doses in which these drugs were administered, atebrin lowered the incidence of clinical malaria to a greater extent than did quinine, during the period of treatment, and atebrin had the great practical advantage that it caused no unpleasant symptoms, is not unpleasant to take, and needed only one mass treatment weekly. Atebrin in prophylactic doses, as has been shown by other workers, is of much greater gametocidal value than is quinine, and it would appear that this action was responsible mainly for the apparent reduction of clinical malaria in the untreated group in the population.

The expenditure on the atebrin course in this experiment was about seven times as high as the expenditure on quinine, unfortunately the evidence obtained is quite inadequate to make any precise estimate of the relative returns on the expenditure; it may however, be borne in mind that, in the Malayan experiment, carried out with a slightly larger dose of atebrin and a considerably larger dose of quinine, during treatment the average gametocyte rate was in the quinine group nearly seven times as large as in the atebrin group. As the evidence clearly suggests this reduction in the clinical malaria of this population as a whole was mainly ascribable to the reduction in the gametocyte rate, this coupled with the other advantages atebrin possesses over prophylactic quinine certainly justifies a very much higher expenditure on this drug than on quinine for purposes of prophylaxis.

One important character of atebrin demonstrated by Field, that is given additional stress by this experiment, is that discontinuation of the prophylactic course is liable to be immediately followed by a great increase in clinical malaria, and the evidence from this experiment suggests that possibly this increase is due not only to the infections which are kept latent by the prophylactic course becoming manifest when the attack is discontinued, but that natural immunity may

be temporarily impaired.

In view of this it would seem advisable, if atebrin is used prophylactically, that it should be given regularly throughout the transmission season until the close of the season. With regard to the value of a blanket treatment, there is insufficient evidence to draw any conclusion. The cost of the blanket treatment was as great as five full weeks of the subsequent treatment. Field has shown that with the same prophylactic dose, not preceded by a blanket treatment there was a reduction of 75 per cent clinical malaria as compared with his 'control'. This 'control' no doubt was indirectly and advantageously affected by the treatment, so the reduction in clinical malaria brought about by the dose was almost certainly something greater than 75 per cent. In view of these facts I would suggest that a blanket treatment at the conclusion of the prophylactic course would probably be more advantageous than at its commencement, at any rate in instances where only a proportion of a population receive the course.

# 11. The economic factor

The method of control of malaria and the expenditure on control in an industrial population obviously must be governed by certain practical considerations, such as the cost of the disease to the industry in loss of life, working days and efficiency, and on the practicability and economic cost of the various methods of control, such as permanent biological methods, temporary biological methods, or clinical prophylaxis. In this particular population where permanent biological control offered special practical difficulties, and the benefit obtainable by an economic outlay on temporary control appeared doubtful, clinical prophylaxis seemed to be a more economic method of control. The full dose of gramme 0.3 to the entire population weekly recommended by the makers and administered throughout the whole transmission season and terminating with a blanket treatment might obtain a hundred per cent decrease in malaria, and be economically sound in a highly-paid skilled population resident in a hyperendemic area. Such a course, however, at the present cost would almost certainly be an uneconomical method of controlling malaria in any Northern India tea estate labour force, but on the other hand it would appear from this experiment, in which a substantial reduction was brought about by administering a small dose of atebrin to one-third of the population for twothirds of the transmission season, that atebrin may prove an economic method, in certain cases,

(Continued at foot of next column)

THE MODE OF ORIGIN AND PROGRESS PREGNANT GARDEN COOLIES\*

> By K. P. HARE, M.B., B.S. Hoogrijan

### Introduction

Though extensive studies have been made of the subject, many gaps in our knowledge of the anæmias complicating pregnancy still exist These gaps are particularly noticeable when information is sought concerning the origin of anæmia, chiefly because most of the workers on the subject have been dealing with uncontrolled populations. I use the word origin instead of onset advisedly, because it implies some knowledge of the atiology of the disease and it is probable that more information about the onset will provide the clue to the ætiology of the disease. I have therefore taken advantage of my position as medical officer to a controlled population to study the onset and development of these anæmias. This work has been only the spare time occupation of a general practitioner, so that the amount of material is small and conclusions drawn therefrom await confirmation by other workers in the field. I shall feel satisfied if I can stimulate others who are in daily contact with tea garden labour to record their experience.

### Material

This paper is based mainly on a series of 31 women who were found to be anæmic at all stages of pregnancy, and in part on a study of 182 women who were found to be anæmic after the 28th week of pregnancy, 107 of whom it was possible to assign to definite hæmatological groups. The latter series was detected during routine examinations of all women receiving pregnant leave in a group of 13 estates over a period of 12 months in 1938, and has been fully analysed in a paper which appeared in the April number of the Indian Journal of Medical Research. The former series was detected in 1939

\* Read at the Annual General Meeting, Assam Branch B. M. A., Shillong, 1940.

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of reducing malaria in a low-paid unskilled labour population. Further work could I think with advantage be done to determine the best method of admiring the method of administration in order to obtain the maximum results with the minimum outlay.

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in the following manner. During January 1939 an accurate list was prepared of every woman of child-bearing age on one estate. During February and March each of these women was seen on two occasions and examined for clinical signs of anæmia. Every case so detected was treated and her name was temporarily removed from the list: any found to be pregnant were struck off the list altogether. It was therefore possible to say that at the beginning of April every woman of child-bearing age was either clinically non-anæmic or was under treatment and would not be restored to the list until completely cured. The few who were both pregnant and anæmic were not considered in this investigation.

These monthly inspections have continued and, in fact, the last one is now in progress but this paper deals only with the story up to the end of January. From April onwards every woman found to be anæmic was further examined as to pregnancy. If not pregnant she was treated and her name was not restored to the list until she was definitely cured. If pregnant she was subjected to a series of monthly hæmatological examinations. This method enabled one to say with some accuracy at what period of the year and at what period of her pregnancy each case became anæmic and also made it possible to observe the progress of each case.

# Hæmatological classification

The classification of anemias in pregnancy which I have adopted divides these cases into four groups as follows:-

A. A microcytic-hypochromic group in which the mean corpuscular volume is below 85 cubic microns and mean corpuscular hæmoglobin below 22 micro-microgrammes. Stained films of this group show obvious microcytosis and, usually, vacuolation is marked.

B. A normocytic hypo-orthochromic group in which the mean corpuscular volume usually lies between 85 and 105 cubic microns and the mean corpuscular hæmoglobin is under 30 micromicrogrammes. The stained films of this group are remarkable for the uniformity of cell size. There is practically no anisocytosis.

C. A micro-macrocytic hypo-orthochromic group in which the mean corpuscular volume usually lies between 85 and 110 cubic microns but may be higher and the mean corpuscular hamoglobin is always below 30 micro-microgrammes. The stained films of this group show very marked anisocytosis and nucleated reds are found in the majority of cases.

macrocytic-hyperchromic group in which the mean corpuscular volume is always above 100 and usually above 110 cubic microns and the mean corpuscular hæmoglobin is above 30 micro-microgrammes. The stained films of macrocytosis and always show normoblasts and

megaloblasts\*. In practice some orthochromic cases require inclusion in this group.

The percentage incidence of the various groups in the two series is shown in table I.

TABLE I Percentage incidence of hamatological groups in two series

Hæmatological gr	roup	1938 series	1939 series
Microcytic		49.5 per cent	48.4 per cent
Normocytic		140	12.9
Micro-macrocytic		23.4 "	20.0
Macrocytic		12.2 "	9.7 "

It is obvious that no significant difference exists between the two series.

# Features of the onset of anamia

I was able to show that, in the 13 estates in my charge, the incidence of anæmia in the third trimester of pregnancy during 1938 was fairly uniform throughout the year with the exception of the third quarter, July, August and September, when there was a definite increase which was statistically significant. The distribution of cases in the 1939 series in each hæmatological group according to the quarter in which they became anæmic is shown in table II.

TABLE II Seasonal distribution of cases according to month of onset

	HÆ				
Quarter	A	В	C	D	TOTAL
April, May and June July, August and September.	2 7	2 2	2 5	1 1	7 15
October, November and December.	5	Nil	2	1	8
January, February and March.	1	Nil	Nil	Nil	1

It is obvious that the third quarter of the year is the period of heaviest incidence of anæmia and this appears to apply with greater force in the

I\* We raised the question as to whether these cells were true megaloblasts, to which the writer replied:—
'These are the marrow megaloblasts with basophil cytoplasm and a dense ropy nucleus. They are not, of course, the "megaloblast of Ehrlich" of pernicious anæmia. There seems to be a very marked division of opinion about the nomenclature of these cells—they seem to me to be more primitive than erythroblasts'. blasts'.

From the description we do not think that these would be considered to be megaloblasts by most workers; the ordinary megaloblast has a finely-stippled nucleus: the particular cells described seem to us to be more like erythroblasts, or perhaps what some workers describe as 'macroblasts'.—Editor, I. M. G.1

case of group C but the difference is not statis-

tically significant.

Among the cases detected almost every period of pregnancy was represented. The earliest case was 11 weeks' pregnant and two women remained healthy until the 38th week of pregnancy. The distribution of cases according to duration of pregnancy at onset is shown in table III.

TABLE III

Distribution of cases in 1939 according to duration of pregnancy at onset

	HÆM	TOTAL				
Duration of pregnat	A	В	C	D	TOTAL	
10 to 19 weeks		3	2	1	1	7
20 to 29 "		8	1_	5	1	15
30 to 39 "		4	1	3	1	9
Average duration weeks.	in	24.6	23.0	25.0	21.7	24.3

It is evident that, though anemia may arise at almost any period of pregnancy, it is much the most likely to do so during the third quarter and this is the case whatever the type of anemia. Moreover there is no significant difference between the mean values of duration at onset for each of the four groups.

It is seldom possible to obtain accurate information as to a coolie's age, but in every case a note was made of the apparent age. Table IV shows the distribution of cases in each group according to quinquennial age groups.

Table IV

Distribution of 1939 cases according to age at onset

Age group	HÆM				
Age group	A	В	C	D.	Тотлі
15 to 19 years 20 to 24 " 25 to 29 " 30 to 34 " Average age at onset in years.	3 4 3 5 24.6	3 Nil 1 Nil 20.5	3 3 Nil 3 23.2	2 1 Nil Nil 18.0	11 8 4 8 23.1

There is a tendency for the microcytic type to occur at any age, whereas the other types more commonly occur before the age of twenty-five. This particularly applies to the macrocytic group but the differences are not significant.

Pregnancies involved in the 1939 series varied from the first to the ninth. The distribution is shown in table VI.

TABLE V

Distribution of cases according to pregnancy involved

	HÆMATOLOGICAL GROUPS					
Pregnancies involved	A	В	C	D	Toral	
1st and 2nd		6	2	5	3	16
3rd and 4th		7	1	2	Nil	10
5th and subsequent		2	1	2	Nil	. 5

The first and second pregnancies are obviously the most dangerous but this is due to the preponderance of early pregnancies in types B, C and D. The risk of microcytic anamia is evenly distributed throughout the child-bearing period.

Effects of maternal anamia on the mother and the factus

Of the 27 women who had delivered before the end of January 1940, three died as a direct or indirect result of their anemia. One other patient died four weeks after delivery but this death was directly due to an acute fulminating attack of dysentery which she contracted when her blood picture had returned almost to normal. I therefore propose to ignore this death. Otherwise the distribution of cases and mortality, together with the mortality in the 1938 series, is shown in Table VI.

Table VI

Distribution of cases and mortality in series 1939

and mortality in series 1938

Hæmatol- ogical group	Cases	Deaths	Percentage mortality	Percentage mortality in 1938
A	12	Nil	Nil	3.8
В	4	Nil	Nil	Nil
C	8	2	25.0	12.5
D	3	1	33.3	23.1
TOTAL	27	3	11.1	7.5

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Though the mortality in the 1939 series was rather higher than in the 1938 series, the relationship between the various groups as regards case mortality was well preserved.

In the former series I was able to show that the risks of prematurity and of still-birth were enormously increased in anæmic deliveries as compared with those non-anæmic, and that premature still-birth was a very common result of mature still-birth was a very common result of anæmia in pregnancy. This observation been amply confirmed in the 1939 series as is shown in table VII.

TABLE VII

					120				
7 40	of	the	child	in	the	1939	series	of	anæmics
HAIP C		0100						_	_

Hæmatol- ogical group	Total cases	Cases	Description	Cases
A	12	7 5	Full-term Living Still-born Premature Still-born Living	7 Nil 3 2 2
В	4	2 2	Full-term Living Still-born PrematureStill-born Living	Nil Nil
C	8	6 2	Full-term Living Still-born PrematureStill-born Living	2 3 3 Nil 2
D	3	1 2	Full-term Living Still-born Premature Still-born Living	1 Nil 2 Nil

#### TOTALS

Cases	Description	Cases	Percentage	
27	Full-term living Full-term still-born Premature still-born Premature living		13 3 5 6	48.1 11.1 18.5 22.2

It would appear that the risks enumerated above are relatively increased to some extent in the macrocytic group but are otherwise fairly evenly distributed throughout the groups.

# Features of the progress of the anamia

In a previous paper [Hare (1939a)] I described certain cyclical changes occurring in the blood pictures of untreated cases of anæmia in pregnancy and pointed out that, in that particular series, which was a small one, I had failed to find any evidence of a change from one type of anemia to another in any case. The same experimental attitude was adopted in the 1939 series and treatment was only given when absolutely necessary.

Of the 15 cases listed as microcytic, none had received any anti-anæmic treatment and three were undelivered on 31st January. None of the remaining 12 had ever been or looked likely to be anything but microcytic and hypochromic. One was an early abortion case, two arose late in pregnancy and two, arising at 30 and 31 weeks, refused to undergo monthly examinations. The remaining seven all showed changes in the blood picture of the same order as those described in the previous paper.

Of the four normocytic cases, one received a short course of iron round about the 28th week, but none showed any sign of alteration of type and all showed the cyclical changes.

There were three macrocytic cases. One was hyperchromic, the others orthochromic. All Were macrocytic at their first examinations at

22, 12, and 31 weeks and all received a good deal of treatment with liver extracts, but none showed any alteration in type before delivery. After delivery two became microcytic and the other died.

The number of cases listed as micro-macrocytic numbered nine. Seven of them were of that type at their first examinations, but two originated as typical microcytic-hypochromic anæmias. One was first examined at 11 weeks and altered in type at 23 weeks: the other was first examined at 20 weeks and altered in type at 32 weeks. In the first case the alteration in type was accompanied by a sudden collapse, but in the second the alteration was not accompanied by any symptoms. Of the nine cases, one had not delivered by the 31st January, two arose late in pregnancy and one aborted early. Of the remaining five, four had no treatment before delivery but all showed cyclical changes.

I consider that the facts enumerated above justify the claim that these cyclical changes do occur and provide positive evidence in support of Napier's belief that the microcytic type of anæmia may alter in type. A study of the graphical representations of the changes in the blood picture leads one to believe that the alteration in type is actually an exaggeration of the normal changes and may therefore bear the same explanation. In the former paper I put forward a theory that variation of the feetal demand for hæmopoietic substances, in the presence of a stationary maternal intake, produces the normal variations in the blood picture. If the maternal intake of extrinsic factor drops at the same time as the feetal demand increases, the deficiency is likely to become absolute rather than merely relative. In this way an actual alteration of type would occur. If this is the mechanism, why does not the opposite change (from macrocytic or micro-macrocytic into microcytic anæmia) also occur? I think the reason is that the extrinsic factor deficiency is, so to speak, the dominant deficiency, so that reversal can only be brought about by very heavy doses of liver extract or by removal of the feetal demand as occurs after delivery. In the absence of these two necessities no material reduction in cell size occurs but a reduction occurs in the corpuscular hæmoglobin so that an orthochromic anæmia becomes hypochromic.

#### Discussion

It would appear that, at any rate in the district in which I am working, half the cases of anæmia in pregnancy are microcytic and hypochromic, one-tenth are of the very dangerous macrocytic type, another one-tenth are of the type which I term normocytic and which is, by coolie standards, a mild type of macrocytic anæmia and the remaining three-tenths are of dangerous micro-macrocytic the relatively

Anæmia tends to arise most commonly in the third quarter of the year and the probability is

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on has s as is that the seasonal variations apply equally to. all the hæmatological groups. Now it has been shown by Napier and his assistants that while the microcytic type may show some correlation with the weight of hookworm infection, what he calls the 'liver-marmite group' is much more intimately related with hæmolysis due to chronic malaria. My own previous work has also shown that splenic enlargement is much more frequent in the macrocytic and micro-macrocytic groups and that chronic malaria plays very little part in the ætiology of the microcytic type. It is very tempting to suggest that the seasonal variation in the incidence of group C coincides with the seasonal variation in malaria incidence but the seasonal variation in group A is similar. Maplestone has shown that the incidence of hookworm infection is not steady throughout the year, but is maximal in the spring and the autumn so that the incidence of microcytic anæmia should show two peaks with a trough between them. Again the uniform distribution of macrocytic anæmia throughout the year suggests that acute, as opposed to chronic, malaria does not play an important part in its incidence. It appears to me that whatever part hookworm infection and malaria play in the ætiology of the different types of anæmia, their action is probably uniform throughout the year and we must look for some other factor to account for the seasonal variation.

It is rather striking that, whatever the type of anæmia, the period of pregnancy at which the majority of cases arise is the same. If the primary cause of each type were different this would be surprising: actually it suggests that in all the groups the primary cause is identical. The observations regarding age and parity may be said to be inter-connected since it is obvious that, in the long run, the majority of the earlier pregnancies will be in the younger age groups. Any theory of causation must take into account the slight difference in age incidence in group D as compared with the others.

I would suggest that the primary cause of these anæmias is excessive fætal demand for hæmopoietic substances where the maternal intake is minimal. This theory, I think, adequately explains many of the puzzles presented by these anæmias. According to the level of the maternal intake the deficiency may be relative or absolute. Absolute iron deficiency (with which may be included deficiency of other minerals and of vitamin C) will cause the most severe cases in group A. Absolute deficiency of the extrinsic factor will be responsible for group D. Relative iron deficiency will cause the majority of the group A cases and relative deficiency of extrinsic factor results in the group B cases. A relative deficiency of both iron and the extrinsic factor is responsible for group C. Theoretically chronic malaria is capable of causing a normocytic hæmolytic anæmia and the anæmia caused by chronic blood loss due to

hookworm infection should be of the microcytic. hypochromic type. Therefore the tendency of these two ætiological factors, which I consider to be accessory factors, will be, on the one hand, to reinforce whatever deficiency may be present, and, on the other, so far as malaria is concerned to introduce the hæmolytic element into the

It might be thought that the younger age incidence in group D militates against this theory since one would expect the deficiency to affect all age groups and degrees of parity equally, as it does in the microcytic group. There is, however, a possible explanation for this. It is believed that the extrinsic factor, though probably not vitamin B<sub>1</sub> or B<sub>2</sub>, is closely associated with those substances, being present in foods which include them and absent from those which do not. Now vitamin B, is the antiberi-beri factor and beri-beri is definitely a disease of young adults. In other words, the difference in age incidence actually supports the dietetic theory of causation and is probably due to early adult life making excessive demands for the extrinsic factor.

This theory of causation also accounts for the variation in seasonal incidence. The bulk of the coolies are able to partake freely of green leafy vegetables from November to March and can still obtain some varieties in April and May but from June to October their intake is virtually nil. I am informed that a similar variation in their rice-eating habits prevails. From November to April they normally purchase dhan from the market and home-pound it themselves: during some of that period they are using the dhan they have grown themselves. From May to October they are dependent on milled rice only. Now Macdonald has shown that a significant difference exists between the mean hæmoglobin of families which normally use homepounded rice and families which use milled rice, the former having the higher value. I suggest that, during the rains when the rise in anæmia incidence occurs the intake of iron, vitamin C and extrinsic factor is at a minimum.

The only point about the tables dealing with mortality and feetal survival is that they em phasize the wastage due to these anemias and the urgent need of prophylactic measures against them.

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# A SIMPLE AND EFFICIENT REMEDY IN THE TREATMENT OF SCABIES

By F. A. B. SHEPPARD, M.B., B.S., F.R.C.S. (Edin.) CAPTAIN, I.M.S.

Superintendent, Government Headquarters Hospital, Madura

Scables in this country is so prevalent and often is so resistant to treatment that it constitutes a curse, not only to the individual afflicted by it but to the surgeon whose field is affected by it. A sure, simple and relatively speedy remedy is one to be welcomed. In preparing this note on the treatment of scabies we were surprised to find that in the Madras Presidency the number of cases admitted to hospitals and dispensaries throughout the year 1938 numbered 884,015 for the whole presidency and that next to the fevers it was the commonest disease treated. In addition to being an affliction to the patient and a source of annoyance to the surgeon, it must also be a source of economic loss and inefficiency to the State.

Following a brief reference in the Lancet in 1938 to a form of treatment carried out in Hungary, the scheme there outlined was adopted in the dermatology clinic of the Madura Government Hospital. Its use for over a year has given most encouraging results.

The course of treatment carried out in the hospital clinic is as follows:

- 1. Paint the whole of the body below the neck with a 40 per cent solution of sodium thiosulphite (hypo).
  - Allow it to dry for about 15 minutes.
- 3. Paint with a 5 per cent solution of hydrochloric acid (over the hypo).
  - Allow it to dry for about 15 minutes.
- 5. Repeat the above treatment after an interval of 2 hours.
  - 6. Give fresh linen.

Repeat on the next day.

The patient must not be given a bath before 12 hours after the conclusion of the second day's treatment. An interval of between 3 to 5 days is allowed before commencing a second course of treatment.

The 40 per cent hypo solution and the 5 per cent hydrochloric acid solution are used in all cases except children under 7 years of age in whom half the strength of the above solution is

The treatment has been rapidly and highly successful in the papular type of scabies. In the pustular type, however, it has been found too irritant for comfort, and the practice here has been to give the ordinary sulphur ointment treatment in such cases until the pustules dry up, when the case is treated on the same lines as a papular case.

(Continued at foot of next column)

# A SIMPLE METHOD OF TOMOGRAPHY

By R. VISWANATHAN, B.A., M.D., M.R.C.P. (Lond.), T.D.D. (Wales)

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Tomography, planography, stratigraphy, and sectional radiography are the names given to the methods of radiography, by which a particular section or plane of the body can be photographed with the elimination of objects in the planes above and below the one selected.

The work of Grossmann (1935) and others led to the commercial production of an apparatus which has been successfully used by

# (Continued from previous column)

#### Statistics

Types	Number of cases	Results of treatment Number of cases	
Papular Pustular Mixed Total	100 8 102 210	Cured 177 Relieved 25 Otherwise 8	
Maximum and m mum number courses given.  Minimum m ber of cour Maximum m ber of courses Total num of courses all cases Average per ca Cases that w sent from surgical wa for pre-ope tive treatme	of um- ses 2 um- es 8 ber for 548 use 2.5 ere the	Occupation of patients treated. Police constables 8 Dhobi 2 Coolies 205  Other important complications. Kahn positive cases 11 Albuminuria 29 Glycosuria 1 Other intercurrent diseases 27	

It has been found that almost all the cases complain of a mild burning sensation after application of the hypo solution and in cases where there are pustules the irritation is severe. In 12 cases a few fresh eruptions the size of a pin's head appeared after painting. In these cases the treatment was interrupted for a day or so, and the eruptions quickly disappeared.

In addition, all cases of scabies irrespective of type are given an opening dose of mistura alba and cod-liver oil 1 drachm twice daily.

All other complications such as nephritis, syphilis, etc., are treated simultaneously.

One of the most noticeable effects of this form of treatment is that the itching sensation disappears even with the first course of treatment. By the second or third course most of the cases

Obvious advantages of this scheme of treatment are that it is relatively clean, and except in the worst cases, hospitalization is unneces-

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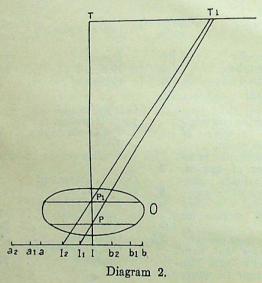
McDougall and others for the study of the anatomy of the lungs and the diseases of various organs. The instrument, as put on the market by commercial firms, is prohibitively costly, though its mechanism is quite simple. The principle of its working consists in moving the x-ray tube and the film simultaneously in opposite directions when the exposure is made. Grossmann's tomograph is a convenient and practical instrument in which the tube is carried by the upper end of a pendulum the lower end of which as it swings, moves a film carrier, which is attached to it, in the opposite direction.

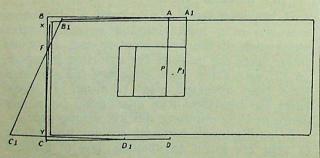
# Physics of tomography

Grossmann (1935) and Andrews (1936) have described recently the principles involved in considerable detail.

In the diagram 1, T is taken to represent the position of the tube, O the object, and ab the







film. If P is a point in the plane to be photographed the rays coming from T will cast a shadow of P at I on the film ab. If the tube is moved to the position T<sub>1</sub> the image of P will fall at a point I<sub>1</sub> on the film. If, on the other hand, when T is moved to T<sub>1</sub>, the film ab is moved to a<sub>1</sub>b<sub>1</sub>, the image of P will always fall at the same point on the film. In the same way all the points in the plane of P will cast clear shadows on the film. Whereas a point P<sub>1</sub> in another plane casting a shadow at I on the film

in the beginning will east a shadow at I2, when the tube is moved to T<sub>1</sub>. Hence all the points on that plane will east only blurred images if on that plane will east only stated images if the film is shifted from the position ab to a,b, only. If on the other hand when T is being moved to T<sub>1</sub> the film is moved to a<sub>2</sub>b<sub>2</sub>, so that moved to  $I_1$  the film moves to  $I_2$  the points in the plane through  $P_1$  will cast clear shadows on the film. Hence by varying the extent of movement of the film different planes can be photographed. The principle of any apparatus designed for the purpose consists in fixing the tube and the film to the opposite ends of a rod which is free to have a pendulum movement over a fulcrum which can be fixed at any point along its length. The position of the fulcrum will naturally correspond to the plane to be photographed. By changing its position the different planes in the fixed object can be brought to

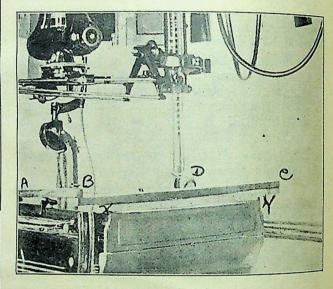


Fig. 1.—Attachment for horizontal tomography.

Another method which has suggested itself to one of us (R. V.), and by which different planes can be focused, is to have fixed fulcrum while the position of the object is changed.

We are of opinion that for tomography a simple cheap contrivance can be designed to be attached to any serviceable x-ray couch, which provides for the free movements of the tube and the film carrier.

The senior writer has designed two attachments, one for taking pictures in the erect posture and the other in the lying-down posture. As suggested by Twining (1937), our attachment is intended to utilize the movable tube stand and the Potter-Bucky diaphragm. The design of the Victor x-ray couch, model 33, is particularly suited for making the attachments easily.

The attachment consists of three wooden pieces AB, BC and CD, hinged at B and C. XY is another piece of wood fixed horizontally to one end of the x-ray table. BC is placed on XY and pivoted to XY at the point F, by means of

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a nail which acts as the fulcrum around which BC can be moved in a horizontal plane on XY. A is connected to the film carrier while D is fixed to the vertical stand which carries the tube.

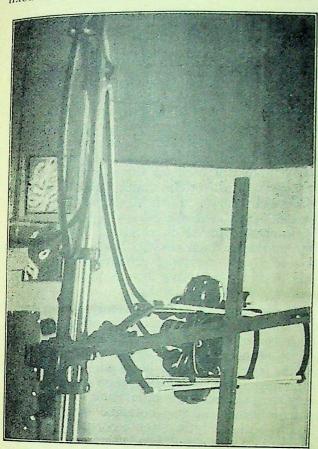


Fig. 2.—Vertical attachment.

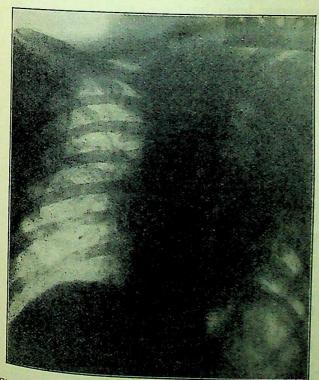


Fig. 3.—Ordinary x-ray picture showing a dense shadow on the left side.

When BC is moved round the fulcrum F, D and A will move in opposite directions. The extent of movement of A and D will depend on the position of the fulcrum F on BC. The point to be remembered in the construction of the attachment is that the length of BC should be equal to the distance between the film carrier and the tube. In that case the distance BF will give the distance of the plane focused from the film. Several holes are made at half-inch intervals on BC, so as to change the position of the fulcrum. For smaller variations of the planes to be photographed, we keep the fulcrum constant while we change the position of the object by interposing cardboards of 18th inch thickness between the table and the object. By piling up cardboards one above the other the object can gradually raised and a different plane of the object can be

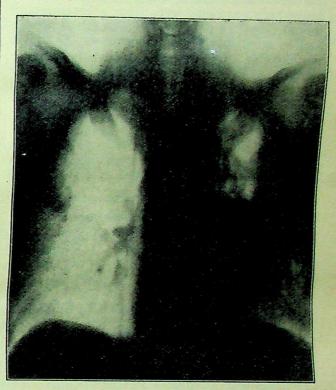


Fig. 4.—Tomograph of the same case showing the presence of cavities in the left upper lobe. The plane focused was two inches behind the sternum.

photographed each time. The tube stand is drawn by a string going over a pulley which is fixed to the C end of the table. The other end of the string is connected to a weight which if let down will automatically pull the tube. The operator holds on to the tube stand by another string which he lets go simultaneously with the making of the exposure. The tube will move in the direction DC, from D to D<sub>1</sub> while the film carrier P connected to A will move in the opposite direction to the position P<sub>1</sub>.

The attachment for taking a tomograph in the erect posture is based on the same principle of utilizing the movable Potter-Bucky and the tube stand, though with necessary modifications

(Continued at foot of next page)

STREPTOCOCCUS PYOGENES IN THE THROATS OF A SAMPLE OF HEALTHY INDIVIDUALS

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Swabs taken from the tonsils and nasopharynx of 300 apparently-healthy individuals were examined for the presence of Streptococcus pyogenes and certain other organisms. The individuals examined were from a heterogenous group of healthy persons who for various reasons had occasion to visit the laboratory. As it was not possible to arrange for repeated examinations of a large series of persons the results recorded are based on a single examination of each individual.

Records were maintained of the nationality, residence, occupation, sex, age, general health, history of any past throat infection, state of the gums, teeth and throat of each individual. A throat swab was firmly rubbed over both tonsils

#### (Continued from previous page)

in its design. In this the film carrier and the tube carrier are connected by a horizontal rod which is pivoted to a fixed vertical rod, so much so that the former is free to move round the

pivot in a vertical plane.

We have also found it possible to connect the film carrier and the tube carrier by strings carried over a multiple pulley adjusted in such a way that when the tube moves a certain distance the film carrier will move in the opposite direction over a requisite smaller distance. This method is now under trial.

The results achieved by us are quite comparable to those of others with the use of more costly instruments. The accompanying photographs bear testimony to it. The attachment

costs less than two rupees to make.

Tomographic studies are of immense value in thoracic surgery. As it is not adequately recognized in India we hope that the publication of this paper will encourage the wider use of this method of radiographic studies by means of the simple and exceedingly cheap contrivance we have described.

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The charged swab was smeared on 8 per cent defibrinated rabbit-blood agar and the plate incubated erobically at 37°C. The next day any suspicious colonies (fine colonies about the size of a pin's head surrounded by a zone of  $\beta$ -hæmolysis) were picked up and inoculated into 10 per cent defibrinated rabbit-blood broth and incubated erobically. The tubes were shaken occasionally during the first four to six hours of growth—this gave with the hamolytic strains a more uniform hamolysis when the tubes were examined the next day. The growth in blood broth was used for the study of the morphology. Strains were maintained on rabbitblood-agar slopes. Each strain was plated on heated 5 per cent sheep-blood agar (chocolate blood agar) and the character of any discoloration on this medium noted. The majority of the strains of Str. pyogenes produce no change in this medium, but some strains produce a faint narrow zone of discoloration.

The presence of soluble hæmolysin was tested for by adding equal quantities of a suspension of 5 per cent washed rabbit-blood cells to an 18 hours' old culture in 20 per cent horse-serum broth, incubating for 2 hours and then keeping in a refrigerator overnight, when the final readings were taken. It is interesting to record that potent hæmolysin was obtained by growing a strain of hæmolytic streptococcus in ordinary nutrient medium and incubating in an atmosphere containing 10 per cent CO<sub>2</sub> or anærobically whereas the same strain in the same medium or in serum broth incubated ærobically produced no hæmolysin.

Hæmolysis was also tested for by the poured-plate method using for this purpose the serum broth culture as the inoculum in rabbit-blood agar. This was most conveniently done by taking a minimal inoculum with a straight fine wire and inoculating into 1 c.cm. of defibrinated rabbit blood placed in a sterile petri-dish, after which 12 c.cm. of melted and cooled nutrient agar was added and the whole mixed by gentle rotatory movement. The hæmolysis around the deep colonies was noted after 24 hours' incubation and again after a further 24 hours and 48 hours in the refrigerator. The degree and quality of hæmolysis and the character and extension of any hæmolytic zones were noted.

The fermentation of lactose, mannitol, sorbitol and salicin (in serum water with Andrade's indicator) was tested with 33 of the 54 strains of hæmolytic streptococci isolated.

In a series of 50 examinations primary inocullations were made both on horse-blood agar and on rabbit-blood agar. The number of isolations of Str. pyogenes on these two media were approximately the same and as it was more convenient to use rabbit-blood agar, this medium was used for the examination of the whole series.

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nocuar and ations were more edium series. In a small series of experiments in which primary cultures were made also on sheep-blood agar, the number of isolations on sheep-blood agar was considerably less than the isolations obtained on horse-blood or rabbit-blood agar.

In another series of 70, primary plate cultures were made in duplicate sets of plates, one set incubated ærobically and the other anærobically (in McIntosh and Fildes' jar). The number and percentage of isolations of Str. pyogenes in the two sets of plates are given in table I.

### TABLE I

The number and percentage of plates yielding Str. pyogenes when incubated ærobically and anærobically

Incubation			Number and percentage of positive isolations			
Aerobid			11 or 16 per cent			
Anærobic			16 or 23 ,,			

Although the difference of isolation in the two series is not of statistical significance it appears that incubation under anærobic conditions gives better results. This agrees with the conclusion arrived at by Topley and Wilson (1936) that it is desirable that primary plate cultures should be incubated anærobically rather than ærobically. A further advantage of the anærobic incubation of surface-spread plates from primary culture is that the hæmolytic zones are better developed in plates incubated anærobically and there is distinctly less growth of other organisms than in the plates incubated ærobically. The colour of the medium remains unaltered longer under anærobic conditions than under ærobic incubation. As however it was not convenient to employ anærobic method of cultivation for the whole series the results recorded in this paper are based on the findings obtained with ærobic

The examinations of the other organisms reported in this paper were carried out according to well-known standard methods and need not therefore be given in detail here. The further identification of the alpha hæmolytic streptococci or the viridans streptococci into different species was not attempted but they are grouped together as viridans group.

The results of the examination of swabs taken from the tonsils and nasopharynx of 300 apparently-healthy persons are summarized in table II.

No significant difference was found in the frequency of isolation of Str. pyogenes from—

(a) perfectly healthy looking throats (Str. pyogenes isolated from 21 or 15 per cent of the examined) and throats showing varying degrees of congestion but without any clinical symptoms (Str. pyogenes isolated from 33 or 20 per cent of the 160 examined),

### TABLE II

The frequency of Str. pyogenes and certain other bacteria in the nasopharynx of 300 apparentlyhealthy individuals. These results are based on a single examination of each person

Organism	Number of persons from whom isolated	Percentage of persons from whom isolated	
Str. pyogenes		54	18
Str. viridans group		141	47
Str. alpha prime type		17	57
Hæmophilus influenzæ molytic type).	(hæ-	156	52

(b) throats heavily stained with 'betel mixture' ('pan') and those not stained or of non 'pan-eaters',

(c) throats with accompanying pyorrhea and

without any pyorrhœa.

It must be noted, however, that the numbers examined in each group are not sufficient to demonstrate any small significant difference in the various groups. The number of persons examined during the cold weather (November to February) and the hot weather (March to June) and the results obtained are shown in table III.

### TABLE III

The number of persons examined in the cold weather (November to February) and in the hot weather (March to June) and the number and percentage of isolation of specified bacteria

	Nu	MEER NED 187	Hot Weather. Number Examined 113		
	Isolated from	Percent- age	Isolated from	Percent-	
Str. pyogenes	29	16	25	22	
Str. viridans group	82	44	59	52	
Str. alpha prime type	6	3	14	12	
Hæmophilus influenzæ (hæmolytic type).	100	53	54	48	

Thirty-three of the 54 strains of the betahæmolytic streptococci isolated from the throats were examined by the precipitin test with type serum of group A, other sera were not available. The method of the preparation of the precipitating serum and the method of testing were according to the methods advocated by Lancefield (1933). Twenty-three or 67 per cent of (Continued at foot of next page) NATURAL LEPTOSPIRAL INFECTION IN THE RAT POPULATION OF CALCUTTA

By B. M. DAS GUPTA

(From the Department of Protozoology, School of Tropical Medicine, Calcutta)

Soon after the discovery of the causal organism of Weil's disease by Inada and Ido (1915), the proof was forthcoming that rats which harbour the organism in their kidneys are responsible for the dissemination of the disease. The presence of natural leptospiral infection in wild rats was first recognized by Miyajima in Japan [Walch-Sorgdrager (1939)]. Since then it has been found to exist in many parts of the world, even in areas where leptospiral infection in man is unknown. For example, in New York the incidence of natural infection in rats is enormously high (about 60 per cent), but no case of the disease among human beings has so far been recorded. In Calcutta Knowles (1928) examined 180 rats, but none were found infected. Later on, the same observer (Knowles, 1932) discovered two infected rats out of 193 examined. But unfortunately the leptospira could not be isolated and identified. After the isolation of L. icterohæmorrhagiæ from a human case of acute hæmorrhagic jaundice (Das Gupta and Chopra, 1937), the present writer undertook a

(Continued from previous page)

the 33 strains of hæmolytic streptococci so examined fell into Lancefield's group A.

The strain of Str. pyogenes isolated from the throat produced acid but no gas in salicin, lactose, and no change in sorbitol or mannitol. The fermentation of the sugars was as a rule slow and the final reading was taken after 14 days' incubation. Twelve strains of Str. pyogenes were tested for pathogenicity by intraperitoneal inoculation into mice and were found to kill the animals in 1 or 2 days.

#### Summary

Swabs taken from the tonsils and nasopharynx of 300 apparently-healthy individuals showed the presence of hæmolytic streptococcus in 54 or 18 per cent of the persons examined. Of the 54 persons from whom hæmolytic streptococci were isolated 33 or 67 per cent yielded streptococci belonging to Lancefield group A, or that approximately 10 per cent of the sample of population were carrying examined pyogenes (Lancefield group A). These observations stress the fact that hæmolytic streptococci occur not only in pathologically affected tonsils but also in the throats of normal persons.

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systematic examination of rats with a view to demonstrating the infection and identifying the spirochæte with reference to its serological classification. Three hundred and ten rats were examined; out of this number 230 animals were trapped in or near the patients' houses.

### METHODS EMPLOYED

# I. Microscopic examination of the kidney substance

It has been the experience of several workers that in rats leptospiræ are found exclusively in the convoluted tubules of the renal cortex, and even then only here and there. Large portions from the cortex of both kidneys were, therefore, ground up with sterile sand in an agate mortar and emulsified in physiological saline. The emulsion was examined under the dark-ground illumination.

# II. Inoculation of susceptible animals

Kidney emulsion was prepared as above and filtered through coarse muslin before inoculation. As a sufficient number of young guineapigs were not available, material from six rats was pooled and 2 cubic centimetres of the mixture were injected intraperitoneally into one guinea-pig, except in the cases in which leptospiræ could be demonstrated in their kidneys by direct microscopic examination. Leptospiræ were detected only in 5 specimens, and the kidney substance from each of these animals was inoculated into one separate guinea-pig. Of these 5 guinea-pigs, which received the infected inoculations, 4 did not show any evidence of leptospiral infection during the observation period of two months. The fifth guinea-pig. however, looked very ill on the fourth day after inoculation, and its peritoneal fluid showed a large number of motile bacteria and a few leptospiræ. Lest the animal should die at night and the strain of leptospira be lost, it was all the strain of leptospira beidness. it was chloroformed and its liver, kidneys, and blood were inoculated into 3 guinea-The animals inoculated pigs respectively. The animals moduled with the blood and liver suspension died on the third day. The smears from liver and kidneys were examined, a few hours after death and they showed only bacteria and no leptospiræ. The guinea-pig inoculated with the kidney emulsion supplied till the girth day. kidney emulsion survived till the sixth day, when it was moribund. At this stage it was killed and cultures of heart blood, kidneys, liver and spleen were taken in nutrient agar. growth of a motile bacillus of the Salmonella group was obtained from the blood and organs. The liver, which also showed a mixture of bacterie and teria and leptospiræ (the former predominating) by direct microscopic examination, was emulsified and a portion fied and a portion of the emulsion was inoculated subcutaneously. subcutaneously into one guinea-pig and intraperitoneally into one guinea-pig and invalidation showed the mixed infection. showed the mixed infection, as in the preceding series. In order to interest the preceding in a series. In order to isolate the leptospira in

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pure state, two pups were inoculated intraperitoneally with the infected liver (showing both leptospira and bacteria), as it was thought that pups which are susceptible to leptospiral infection might prove refractory to infection with the bacteria. One pup (the younger of the two) died of the bacterial infection within 72 hours of the inoculation. Its heart blood gave a pure culture of the same bacillus as was isolated from the guinea-pig. The other pup was chloroformed when its peritoneal fluid showed a few leptospiræ on the sixth day after inoculation. The entire liver was cut into pieces and ground up in normal saline. A drop of the suspension was examined under the dark-ground illumination, and it showed both the bacteria and leptospiræ. The whole bulk of the suspension was lightly centrifuged and the supernatant fluid was filtered through the L<sub>2</sub> Chamberland candle. Four guinea-pigs were inoculated each with 3 cubic centimetres of the filtrate. One cubic centimetre was transferred to each of 4 tubes of Vervoort's medium (one tube containing 10 cubic centimetres). In order to ascertain whether the candle was capable of retaining the bacteria, one cubic centimetre of the filtrate was inoculated into nutrient broth and it remained sterile for more than 3 days. One of the 4 cultures in Vervoort's medium showed a pure growth of leptospiræ two weeks' after incubation at room temperature (22°C. to 28°C.). The concomitant bacillus was thus eliminated. All the 4 guinea-pigs which received inoculations of the filtrate succumbed to leptospiral infection in periods ranging from 13 to 19 days. Cultures of heart blood from one of these guinea-pigs, taken immediately after death, also gave a pure growth of leptospira. The rat leptospira thus isolated, is agglutinated in a high dilution (1:10,000) by the serum obtained during convalescence from the patient in whose house this particular rat was caught. The leptospira isolated from this patient had been already found to be homologous with the classical L. ictero-

# III. Serological tests with the rats' serum

hæmorrhagiæ strain.

The sera of 100 rats including two of the 5 animals which showed leptospiræ in their kidhevs were tested for agglutinating and lytic effects on a human strain of leptospira isolated locally. As soon as the rat was killed, the thorax was opened and blood withdrawn by puncturing the heart with a capillary pipette, as rats' blood has a tendency to clot rather rapidly after their death. Rich living cultures grown in Vervoort's medium, free from naturally developing clumps, were usually used. In a few cases, however, formalinized cultures intended for human vaccination. cination were used when suitable live cultures were not available. Four dilutions of the serum, : 10, 1: 20, 1: 40 and 1: 80 were first made. These were then mixed with equal volumes of the culture. In only one instance further dilutions up to 1: 1,280 had to be made. In many

cases control preparations, using normal rabbits' serum, were also put up. The tubes containing the different dilutions were incubated at 37°C. for 3 hours. At the end of this period these preparations were examined under the darkground microscope beginning with the highest dilution.

# IV. Culture of the renal cortex

Small pieces of the tissue were inoculated into Vervoort's medium and incubated at room temperature (22°C. to 28°C.). The cultures were examined under the dark-ground microscope from the 7th day onwards.

Results of observations on the different methods

1. Leptospira was detected in only 5 specimens. All these animals were trapped in patients' houses, two in one house and the rest in three different houses. The infected rats were identified as follows:

Three specimens were Mus decumanus Pallas, 1 Bandicota elliotana Anderson and 1 Rattus rattus rufescens (Gray). Eleven specimens showed an infection with Trypanosoma lewisi, 8 with Spirillum minus and several showed motile bacteria.

- 2. Fifty-six guinea-pigs were inoculated with the kidney emulsions, 38 remained alive and well during the observation period of 6 weeks. One animal showed a mixed infection with leptospira and a motile bacillus. The remaining ones died of causes other than leptospiral infection.
- 3. One hundred samples of sera were examined. Only 4 gave positive reaction. Two specimens reacted in a dilution of 1:40, and one in 1:80. The fourth specimen gave a titre of 1:640. Of these 4 positives, 2 specimens were obtained from the animals which showed leptospire in their kidneys. As 3 of these sera yielded only low titres, it was thought that these might be co-agglutinations. So one such specimen (showing an agglutinating titre of 1:80 against a local human strain) was also put up against Hond Utrecht (canicola), Andamans CH31, Andamans CH11, Rachmat, Swart V. Tienen, Sejrö M. 84 and Kantorowicz (classical strain). The results were negative for all these strains except the last-named one which was agglutinated in a dilution of 1:100. It is, therefore, quite possible that the rat was infected with the classical L. icterohæmorrhagiæ strain.
- 4. Renal substance of 100 specimens of rats were cultured. Thirty-eight specimens, including the 5 in which leptospiræ were detected by the direct microscopic examination, showed heavy bacterial growth. Only in 6 cases were these bacteria investigated and found uniformly to belong to the Salmonella group. It may be mentioned here that Lal (1939) noted that 14 per cent of Calcutta rats showed an infection with organisms which agglutinated with the sera of both Bact. wrtrycke and Bact. enteritides.

The other cultures remained sterile for more than a month.

### Summary

The kidney substance of 310 wild rats trapped in different parts of the city of Calcutta, especially in the infected areas, were examined by the dark-ground illumination and by animal inoculations. One hundred of these specimens were also cultured on Vervoort's medium. Besides, 100 samples of sera from these animals were tested for agglutinating and lytic effects on a strain of leptospira isolated locally from a human case. Leptospiræ were detected in the kidneys of 5 animals. Two other animals gave serological evidence of leptospiral infection. A strain of rat leptospira was isolated by animal inoculation and identified. It was found to be homologous with the classical L. icterohæmorrhagiæ strain which is responsible for infection in man in most cases in Calcutta. The animals which showed leptospiræ in their kidneys were identified as Mus decumanus Pallas-3 specimens, Rattus rattus rufescens (Gray) and Bandicota elliotana Anderson-one each.

My thanks are due to the bacteriology departs ment of the school for assistance in the matter of isolation of leptospira from a mixed bacterial infection, and to Dr. Baini Prosad, p.sc., Director, Zeological Survey of India, for identifying the infected rats. I am also greatly indebted to Prof. Schüffner of Amsterdam for testing a specimen of rats' serum against different serological groups of leptospira.

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# A Mirror of Hospital Practice

### A DERMOID CYST IN THE RIGHT AXILLA

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and

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History.—S. K. D., aged 10 years, was admitted to hospital on 7th August, 1939, with a cystic swelling in the right axilla bulging the pectoralis major muscle on that side. His father says that the swelling started painlessly 6 years ago. Lately it became painful and acquired definite

Family history.—Nothing particular.

General survey.—A well nourished, intelligent child with no abnormality, pulse 80 per minute. Respiration 20 per minute. Temperature 97.6°F. Body weight 4 stone 6 pounds.

Inspection.—Extent of the swelling—superiorly from beneath the outer half of the right clavicle to the 4th right intercostal space in the mid-axillary line below, medially to just short of mid-clavicular line, posteriorly and laterally to the posterior wall of the axilla, prominent anteriorly and inferiorly in the form of a uniform regular bulge about the size of an orange. It is slightly constricted in its upper part. There are a few prominent yeins on the skin over the swelling

a few prominent veins on the skin over the swelling.

Palpation. (i) No local rise of temperature,
(ii) slightly tender, (iii) lobulated, (iv) consistency,
cystic, and (v) transillumination test, negative. It lies deep to the pectoralis major.

Examination of blood and urine revealed no abnormality.

Operation.—The boy was operated upon on 23rd August, under paraldehyde and ether anæsthesia.

An incision about 3½ inches in length parallel to and just behind the anterior axillary fold was made. After Just behind the anterior axillary fold was made. After all bleeding vessels were ligatured the swelling was explored at its most dependent part, i.e., in the floor of the axilla. It was found to be cystic and bluish in colour. Lipoma was immediately negatived and a cyst was evident. Dissection was not uneventful although not difficult except near its apex. During manipulation it burst. The fluid which drained out was slimy, shiny, yellowish-green and slightly opaque. The apex was firmly adherent to the adjacent struc-The apex was firmly adherent to the adjacent structures and the cyst had to be divided at this part. The remainder of the wall at the apex was dissected out and scissors were used to separate it from a definite fibrous band which extended towards the neck. A drain was put in and the remainder of lesed with drain was put in and the wound was closed with 70° of abduction and 20° of flexion of the arm.

Post-operative course.—Uneventful.

Macroscopic characters of the cyst wall.—Encapsulated, bilocular with a smaller bulge at the apex. The inner lining was shiny and the thickness was not uniform all through and moderately hard at places.

Histological

Histological characters of the cyst wall.—(1) Definite fibro-elastic capsule, thick in places and containing inflammatory cells on the outside (Van Geisson's stain—figure 1). -figure 1).

(2) Internal to this was a layer of connective tissue intermixed with elastic fibres and containing the following structures: ing structures:-

(a) Islands of cartilage, both hyaline and yellow elastic variety (elastic tissue stain—figure 2).

(b) Definite lymph and stain—figure 2).

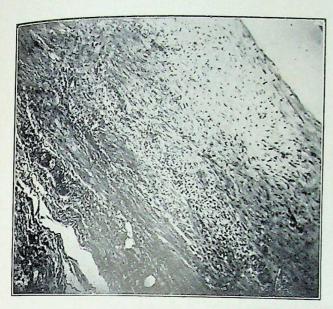
(b) Definite lymph nodes of various sizes (hæmar xylin and eosin stein for the size of various sizes)

toxylin and eosin stain—figure 3).

(c) Bundles of unstriped and striped muscle fibres

(d) Islands containing acicular and rhomboid lipoid crystals, with no degenerative change nearby and with

## PLATE V



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Fig. 1 (low power) showing outer fibro-elastic capsule with blood vessels, round cell infiltration. Inner connective tissue layer showing round cell infiltration.

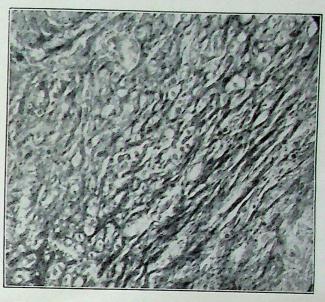


Fig. 2 (high power) showing cartilage cells and yellow elastic fibres.

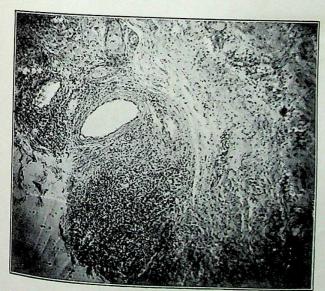
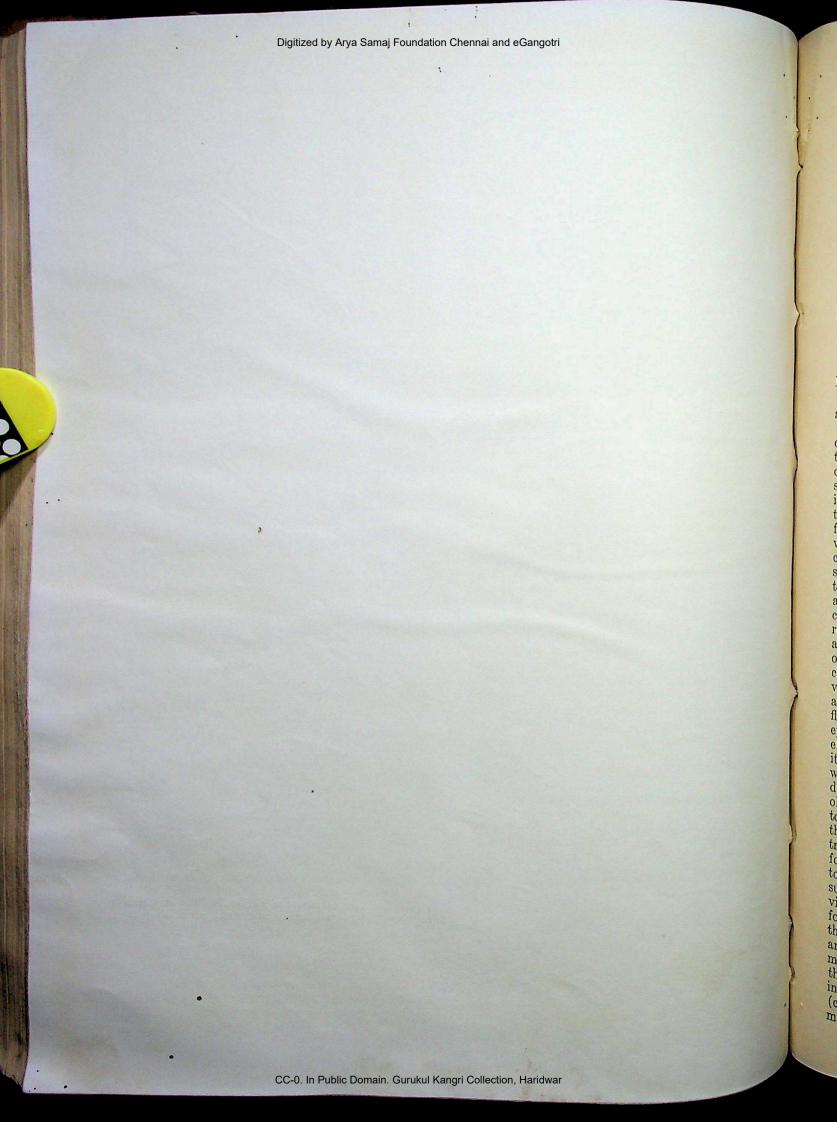


Fig. 3 (high power) showing lymph follicle and blood vessels in the wall and two bundles of muscle.



Fig. 4 (high power) showing giant-cells some of which show engulfing lipoid masses and round cell infiltration.



foreign body giant-cells systems round them, many of which are seen with a lipoid crystal in their body (figure 4).

(e) Inflammatory cells.
(3) No epithelium was detectable internal to this.

### Discussion and diagnosis

All these findings show that the cyst is a developmental one and differential diagnosis lies between—

- (1) Lymphatic cyst.
- (2) Cystic hygroma.
- (3) Dermoid cyst (Bidermal) variety of Ewing.

Diagnosis of dermoid cyst is obvious as the other two are ruled out by—

- (a) Characters of the contents.
- (b) Absence of endothelium lining the wall.
- (c) Presence of characters of dermoid of Ewing in its wall.

(d) No penetration in different planes in the axilla and easy enucleation of the cyst.

An attempt is made to explain the possibility of dermoid cyst in the axilla as follows :- In the third week of embryonic development the region of the future neck is occupied by 5 arches separated externally by pharyngeal grooves and internally by pouches. The 4 arches caudal to the first do not meet in the middle line with the fellow on the opposite side externally, but their ventral ends are directly against the pericardial cavity separated by a plane of loose tissue—the sliding plane of Frazer. As the head rises from the primitive dorsal curve of the vertebral axis at the flexure line of the future neck, i.e., just caudal to the second arch (second groove), the region of the neck comes into existence and is an anatomical region when the developing lungs on the two sides in the pericardio-peritoneal channels push the heart caudally. The precervical sinus in the meantime has made its appearance and is bounded cranially by the flexure line of the neck, caudo-ventrally by the epipericardial ridge and dorso-caudally by the elevation caused by the cervical myotomes. On its floor lie the third, fourth and fifth arches with the corresponding grooves. With the development of the neck the precervical sinus is obliterated by the migration of cervical myotomes sub-ectodermally which develop into the future infrahyoid, sterno-cleido-mastoid, trapezius and scalenus anticus muscles. The fourth arch artery of the right side, destined to form the first and second parts of the right subclavian artery, lies in the floor of the precervical sinus in the fourth arch tissues. The fourth arch elements, destined to form the thyroid ala and the constrictors of the pharynx and cricothyroideus, is gradually covered up by migrating cervical muscles and thus these with the right subclavian artery lie beneath the infrahyoid group of muscles, scalenus anterior (covering the state of the scalends). (covering only the artery) and sterno-cleido-mastoideus. Accidentally, if the attachment of

the floor of the sinus with the fourth arch artery is firm, the muscle migration of the neck may sequestrate a portion of the wall of the sinus field (lined by epithelium) with the developing subclavian artery. This sequestration of a portion of the epithelium-lined wall may contain all the elements of the fourth arch tissue (cartilage, muscle, lymphoid tissue and nerves). Further descent of the fourth arch artery to the adult site caused by the development of the thorax below and the neck above causes a further descent of this remnant. Later when it develops into a cyst, its wall may have one or all of the following characters:—

- (a) Epithelial lining, stratified squamous variety, columnar or stratified columnar variety.
- (b) Arch tissue derivatives in the wall, muscle, cartilage, lymphoid tissue, etc.
- (c) Lipoid crystals in its wall due to absorption from within the cavity, and it may have giant-cell systems (Ewing).
  - (d) Definite encapsulation.
- (e) It develops in the axilla due to the descent of the subclavian artery and barriers in front of it.
- (f) It is adherent to the subclavian artery through the apex of the axilla.

With the exception of the epithelium every point above-mentioned is in favour of the cyst. Hamilton Bailey in his study of dermoids especially in the neck (branchial cysts) mentions that the wall of the cyst may be devoid of epithelial lining and suggests that repeated inflammation may account for such anaplastic change. Metaplasia of the epithelium may also occur and thus the various types of epithelium above mentioned are explained. It may be added here that a branchial cyst is a variety of epidermoid (monodermal dermoid of Ewing).

As a corollary to this it may be said that as the fourth arch artery on the left develops into the aortic arch no such dermoids occur in the left axilla in connection with the left subclavian artery. And if and when such a dermoid develops from the remnant of the precervical sinus on the left side it should be in the mediastinum, fixed to the aortic arch by a band of tissue and thus the occurrence of many of such dermoids, if not all, in the mediastinum can be explained. One hundred and ninety-one such cases have been recorded in the literature. Our case is one of bidermal dermoid where the epithelium has suffered the anaplastic change mentioned above and has migrated into the right axilla as a sequestrated portion of the precervical sinus.

#### Summary

1. Dermoids in the axilla may occur and are of the nature of sequestration dermoids from the precervical sinus of Frazer. It may be an epidermoid (branchial cyst) or a bidermal dermoid.

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2. They should occur only on the right side.

Many if not all of the sequestration dermoids in the mediastinum are remnants of the precervical sinus and migrate into the thorax with the left fourth arch artery, which develops into the adult aortic arch.

We are indebted to Mr. L. M. Banerjee, Professor of Surgery, Carmichael Medical College, Calcutta, for giving us valuable suggestions and permission to report this case.

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# M. & B. 693 IN PNEUMOCOCCAL INFEC-TION: TWO CASES\*

By S. C. SEN, L.M.F., D.T.M. (Cal.) Attabarrie Tea Estates Limited, Rajmai, Assam

#### Introduction

CHAND, Taylor and Chitkara (1939) and Taylor and Chitkara (1939) published two interesting reports on pneumococcal meningitis and empyema treated with M. & B. 693.

The efficacy of this comparatively new chemotherapeutic agent has already been proved, and to-day it has established the foremost position among the remedies against certain diseases.

In November last I treated a case of pneumococcal empyema by the method recommended by Taylor et al., that is, by combined aspiration and M. & B. 693, resulting with a success.

Case 1.—A male, aged 55 years, was treated for right lobar pneumonia with M. & B. 693 as usual, in the hospital. The temperature came down to 98°F. on the 3rd day of '693' administration, on the 5th day of the ailment. A secondary rise of temperature occurred the same evening and it was subnormal (96°F.) next morning. Since then the patient was apparently doing well except for pain in a localized area over the right side of the chest which persisted from the beginning of his illness.

He had a further rise of temperature on the 8th day after crisis. This assumed the character of morning remission and evening rise.

Laboratory findings—

Blood for malarial parasites-negative (thin and thick film).

Sputum-negative for acid-fast bacilli. Leucocyte count—marked leucocytosis (12,000) Stools—ascaris eggs ++; hookworm eggs ++; trichuris eggs +.

The diagnosis of post-pneumonic empyema was arrived at, after watching for a few days and having completed the laboratory findings together with careful clinical examination of the patient.

Treatment.—He was given M. & B. 693, two tablets morning and evening (2 gm. in a day) for four days only, and an injection of 10 c.cm. soluseptasine. The only, and an injection of the cam, softweeptasine. The empyema was aspirated with a 20-c.cm, record syringe and a large-bore needle on the 11th day of the second attack and 19 days after crisis. But only about 2 c.cm. of thick creamy pus could be withdrawn, in which pneumococci were encountered microscopically. on the day of operation the temperature went up to 99°F. in the evening which was lower than in the pre-operative period. From the next day the patient had a normal temperature and said he was feeling much better, the pain, discomfort and night cough being much relieved. He made an uninterrupted speedy recovery without any further aspiration. He was given a mixture containing creosote, potassium iodide, calcium gluconate, aromatic spirit of ammonia and oxymel scillæ for a few days during and after the '693' treatment.

The points of interest are :-

The pus was thick and creamy, and only a very small quantity could be withdrawn; but aspiration gave immediate relief to the patient.

The M. & B. 693, however, gave a satisfactory result in smaller doses though it was contrary to the recommendation of Taylor et al. that this mode of treatment is not suitable when the pus is thick.

Case 2.—A female, 27 years old, was admitted on 27th November, 1939, with severe broncho-pneumonia. She developed acute meningitis on the 3rd day of the disease when she was receiving the usual M. & B. 693 treatment.

Lumbar puncture—the cerebro-spinal fluid was under tension and Gram-positive capsulated diplococci were found microscopically in the films made from it. The sound or the sound of the sou serological type of the pneumococci could, however, not be determined. Delirium, restlessness, stiffness of the neck, etc., became progressively worse though eight tablets (4 gm.) were given daily, and four injections of 10 c.cm. each of soluseptasine (M. & B. 137) were also given when oval administration was not were also given when oral administration was not possible. The woman eventually died on the 8th day.

It appears that the 693 could not exert its desired influence on the meningeal infection, as the case developed meningeal symptoms during the course of treatment and when the concentration of ill tration of the drug in the cerebro-spinal fluid was likely to be the same as that of the blood.

Taylor and Chitkara (1939) and Chopra et al. (1939) have also reported that sulphonamide derivatives are of living of derivatives are of little value in meningitis of pneumococcal origin though encouraging results were obtained in meningococcal infection.

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Taylor, G. F.

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<sup>\*</sup>Read at a clinical meeting of the O'Conner Memorial Medical Association, Panitola, Assam.

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# Indian Medical Gazette

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# THE STERILITY OF THE SYRINGE

Ir you suggest to the practitioner and the hospital nurse that his or her method of sterilizing syringes and needles is inadequate and that probably on every occasion that they give an injection they introduce living bacteria, they either express great indignation that you should accuse them of what in their opinion amounts to little short of malpraxis, or the superior tolerance of one who knows better and proceed to describe in detail the methods that they have employed with uniform success for many years.

They firmly believe that the methods they employ are above reproach, or, they would not, we hope, use them, and when occasionally an intramuscular quinine injection suppurates, they blame the patient for contaminating the puncture, or imagine rather vaguely that the tissuedestroying action of the drug formed a necrotic focus into which pyogenic organism circulating in the blood had found their way. Yet, nine times out of ten the methods they employ are grossly inadequate, and probably in ninety-nine times out of a hundred they are short of the ideal and they are only saved from disaster by the fact that the tissues of the body have remarkable bactericidal powers, even when they are damaged by such drugs as quinine or emetine.

It is extraordinary how much faith is placed in alcohol as a disinfectant, when in fact in most circumstances it is not only a very poor one, but may be an actual medium for the spread of pathogenic organisms, as was recently shown by a Swiss worker who collected 13 samples of alcohol from different university clinics in Berne and grew bacteria from 12 of them, in one instance isolating Clostridium welchii. Even non-sporing organisms are not killed readily by means of strong alcohol, about fifty per cent alcohol in most circumstances being much more efficacious, but in the presence of serum or pus strong alcohol in particular produces a relatively impenetrable coating of coagulated protein, inside which the most delicate organism may remain alive for a considerable time.

An interesting result of an editorial discussion of the subject in the British Medical Journal has been the number of correspondents it has brought out into the open, who have then proceeded to display the inadequacy of the methods on which they rely, sometimes claiming to have invented' them, or to offer ridiculous suggestions, such as that syringes should be sterilized by ultra-violet radiation.

It is easier to be critically destructive than constructive and, whilst in a modern hospital

there is no possible excuse for anything short of the employment of syringes scrupulously sterile in all their parts, there may be circumstances in private practice where a thousand to one chance has to be taken, and it is far better for the practitioner to know and face this fact than to bluff himself that his methods are perfect. The most satisfactory method of sterilizing syringes, other than by efficient autoclaving which will not always be possible, is by a combination of heat and antiseptics, that is, by boiling for 10 to 15 minutes in 0.5 per cent carbolic acid solution and drying the inside of the syringe and needle with ether. This takes time and when a practitioner has many calls to make with a high percentage of injections to be given, such a procedure at each house will be wellnigh impossible, but, if the syringe is never used for anything but the injection of sterile solutions intramuscularly or intradermally, it should be sufficient if the body of the syringe is sterilized effectively at the beginning of the day, kept in 70 per cent spirit, handled only with surgically clean hands, and the needles attached only with flamed forceps. The needles can be kept separately in sterilized test tubes or other suitable containers from which they must be removed with sterilized forceps, and each used only once during the day.

The syringe or needle is not of course the only source of contamination of a sterile inoculum; a fruitful source is the rubber cap of the bottle in which it is contained. A casual wipe over with spirit or iodine is all that this usually gets, though such a procedure is quite inadequate if the cap is at all badly contaminated. However, a swab soaked in 5 per cent carbolic acid or other equally strong antiseptic and left in contact with the cap for the 10 to 15 minutes that is being spent in sterilizing the syringe should be efficient.

Another source is the patient's skin: the methods usually adopted—tincture of iodine application followed by thorough swabbing with spirit, or the reverse procedure—will only sterilize the surface. Fortunately, the organisms likely to be found in the sebaceous glands or hair follicles are non-pathogenic, at any rate to the individual in whom they occur, and the only real danger lies in subclinical foci of infection from which organisms may be carried deeper into the individual inoculated, or they may contaminate the needle so that if this is not properly sterilized before use again the infection will be transferred to another individual.

This brings us back to the fact that, even if the body of the syringe is treated as we have suggested above, a fresh needle which has been effectively autoclaved or boiled in carbolic acid solution since it was last used must be attached for each patient.

We would like to add that the practitioner, however busy he may be, should attempt to exercise a little more discipline in his bag than we are afraid is the usual practice; if possible he should keep sterile and septic bags, or at least have a rigid division, so that at the end of the day his 'sterile' syringes, rubber-capped vaccine bottles and cotton-wool are not mixed up with pus smears, blood specimens and even fæces tubes, and finally let him not forget that a hundred successful inoculations are no indication that his methods were aseptic, nor are a thousand such any guarantee that on the next occasion he will not inoculate living spores of Clostridium welchii.

# Special Articles

# HÆMATOLOGICAL TECHNIQUE

PART IV

By L. EVERARD NAPIER, M.R.C.P. (Lond.)

and

C. R. DAS GUPTA, M.B. (Cal.), D.T.M. Calcutta School of Tropical Medicine

(7) Determination of corpuscular volume

Principle.—A volume of uncoagulated blood is centrifuged at a high speed in a graduated tube until there is no further packing of the corpuscles. The level of packed red cells and of the serum are read off directly from the tube; from this the proportion of the packed cells to the whole blood is calculated and is expressed as a percentage.

Apparatus required

Graduated cell-volume tubes fitted with rubber corks.

2. Capillary pipettes with rubber teats.
3. High-speed centrifuge machine that will rotate at at least 3,000 revolutions per minute.
4. A balance to ensure that the weight of the tubes

and their contents are about equal.

Cell-volume tubes.—Various types of tubes are in use; these vary in length, bore, and capacity. Wintrobe uses small tubes, 11 centimetres long with a bore of 2.5 millimetres, which are marked in millimetres and centimetres from 0 to 10. In our laboratory, we use a tube 7.5 centimetres long with a bore of 7 millimetres and graduated from 0 to 110. These tubes were specially made for us, by Messrs. Baird and Tatlock, London, to fit in our high-speed centrifuge machine, but comparatively short graduated tubes of this kind are now easily obtainable from instrument makers.

As the degree of packing of the cells depends to a certain extent on the calibre of the tube, it is desirable that the same set of tubes which were used in working out the normal standards should

be used in all subsequent work. Method.—The blood is taken in the usual way into a 5-c.cm. or 3-c.cm. flask containing oxalate (see part I). With a capillary pipette withdraw oxalated blood from the flask after it has been well shaken, fill up the graduated cellvolume tube from the bottom upwards exactly up to the 100 mark, put in a small rubber cork to prevent any evaporation during centrifugalisation, and place it in the centrifuge bucket.

If possible two specimens should be placed in the centrifuge at the same time. In any case, the centrifuge bucket containing the graduated tube must be balanced against a similar bucket and tube so that their weights are exactly equal, before these two buckets are placed in opposite sides of the centrifuge; this elementary principle must be observed rigidly, both for the sake of the centrifuge and for satisfactory packing, Centrifuge at a high speed—2,500—3,000 revolutions per minute—until there is no further packing of the red cells.

The maximum time required for complete packing of the red cells must be found out by a few preliminary experiments. This will depend to a great extent on the centrifuge machine.

The tubes are first spun for 20 minutes at a high speed, the actual speed being noted; they are taken out and the readings taken; they are again spun for another 5 minutes and the readings again taken. The process is continued until there is no difference between two consecutive readings—the time at which the first of these two readings was taken is the time required for complete packing of the cells, as there was no further packing. The mean time in minutes for 10-20 such experiments is taken as the time required for complete packing of cells with that particular centrifuge machine at that particular speed. However, in all subsequent examinations a little extra time, say 5 minutes, should be allowed over and above the mean time determined.

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Generally, the cells are fully packed if the tubes are spun for about 20 minutes in a centrifuge machine at a speed of 2,500 to 3,000 revolutions per minute, but it is safer to allow 30

The tubes are now taken out of the buckets and with a hand lens the marking on the tube corresponding to the level of the packed red cells is noted; is noted; also the top level of the serum is checked. If this is at the mark 100, then the red cell reading to the level of the serum is red cell reading can be translated directly into a percentage, but if it is more or less than 100 the percentage for the percentage figure must be calculated making an allowers. an allowance for this fact.

Example.—If the top of the serum is at the low level and the red cells at 42, the cell volume is  $\frac{1607}{1007} \times 42 = 41.17$  per cent.

With leukæmic blood it is almost impost le to read the territory sible to read the top level of the red cells accurately and therefore the red cells accurately and the red cells accurately accurately and the red cells accurately accu rately and therefore it is difficult to ascertain the correct cell volume.

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Anti-coagulant.—This has been discussed above (part I), but perhaps we should again mention that, if the isotonic mixture of potassium and ammonium, which we recommended, be used, no shrinkage will occur.

On the other hand, if potassium oxalate alone (0.2 per cent) be used, then a factor, × 1.09, must be applied to the cell volume before the corpuscular values are calculated.

Example.—The uncorrected cell volume is 44 per cent; the corrected cell volume will be  $44 \times 1.09 = 47.96$ .

(8) Calculation of corpuscular values

From the red cell count, the hæmoglobin expressed in grammes per cent, and the corpuscular volume, certain absolute values can be calculated.

These values are :-

(1) the mean corpuscular volume (MCV)

(2) the mean corpuscular hæmoglobin (MCH), and

(3) the mean corpuscular hæmoglobin concentration (MCHC).

Mean corpuscular volume

This is the mean, or average, volume of a single red cell.

It is expressed in cubic microns  $(cu.\mu)$  and is obtained by the following method:—

Volume of packed red cells in c.cm.

MCV = per 1,000 c.cm. of blood

Red cells in millions per c.mm.

Example.—Corpuscular volume = 40 c.cm. per 100 c.cm. of blood.

Red cells count = 5,000,000 per c.mm.

Mean corpuscular volume =  $\frac{4}{5}$ ?  $\frac{9}{5}$  = 80.0 cubic microns (cu. $\mu$ ).

Mean corpuscular hæmoglobin

This is the average hæmoglobin content of a single red cell expressed in micro-microgrammes  $(\gamma\gamma)$ .

It is obtained by the following method:-

Hæmoglobin in grammes per 1,000 c.cm.

MCH = \_\_\_\_\_ of blood

Red cells in millions per c.mm.

Example.—Hæmoglobin = 14 grammes per 100 c.cm. of blood.

Red cells = 5,000,0000 per c.mm.

Mean corpuscular hæmoglobin

=  ${}^{140}_{5}$  =  $28.0\gamma\gamma$ .

Mean corpuscular hæmoglobin concentration

This is the mean, or average, of the hæmoglobin concentration in each cell, and is expressed as a percentage of the cell contents:—

Hæmoglobin in grammes per

100 c.cm. of blood

Volume of packed cells in
c.cm. per 100 c.cm. of blood

 $E_{xample}$ .—Hæmoglobin = 14 grammes per 100 c.cm. of blood.

Corpuscular volume = 40 c.cm.

Mean corpuscular hæmoglobin concentration =  $\frac{1}{46} \times 100 = 35.0$  per cent.

That is to say, in this instance 35 per cent of the cell substance consists of hæmoglobin.

The great advantage of these mean values is that, in calculating them, it is not necessary to decide on any arbitrary normal, as one does in calculating indices, e.g., the colour index, for arriving at which one usually considers 5,000,000 red cells per c.mm. and 100 per cent (? of what) to be the normal values. Unqualified, a colour index is a meaningless expression, as even if the above normal values have been taken, it is still uncertain what 100 per cent hæmoglobin means (vide part I). If later one decides on the normal values for the particular population, then it is very simple to calculate the colour index.

Example.—MCH of the particular case = 35  $\gamma\gamma$ .

Mean MCH of the population = 30  $\gamma\gamma$ .

Colour index (CI) =  $\frac{3}{4}\frac{1}{6}$  = 1.16 = 1.17.

Similarly, the volume index and the saturation index can be calculated from the MCV and

MCHC, respectively.

There is in our opinion little point in calculating these indices, and we recommend workers to get into the habit of thinking in terms of mean corpuscular values instead of indices, just as they should get into the way of thinking in terms of grammes of hæmoglobin instead of

percentages.

Normal values.—There are undoubtedly different normal values for different populations. We will consider mean corpuscular volume first: Whitby and Britton give 86 as the mean, with the range from 80 to 94, but neither these writers, nor the majority of others who give a 'normal range', make any attempt to explain what they mean by the 'normal range'. They can scarcely mean that all normal observations fall within the range, but they do not specify what percentage of observations may be expected to fall within it. If one gives the mean (m) and the standard deviation (sd) of a number of observations, that at least does mean something definite, namely that two-thirds of the observations will fall between m + sd and m - sd, and that 19 out of 20 will fall between m + 2  $\times$  sd and m  $-2 \times$  sd.

The last figures seem reasonable ones for practical purposes and can certainly be applied amongst hæmopoietically more stable populations than we usually encounter in India, but in most of our populations it provides too wide a range. Even for our Calcutta series in which the mean is 90.49 cu.  $\mu$ , the range would be  $(90.49 + 2 \times 7.90 =) 106.29 \text{ to } (90.49 - 2 \times$ 7.90 =) 74.69, or in round figures from 75 to 106: this is too wide to be considered a normal range, though the mean is close to that given by other workers. On the other hand, some of the Assam, so-called normal, populations have a very low MCV, and if the same rule were applied the range would be ridiculously low, e.g., 57.21 to 85.37 cu.  $\mu$  in the first Assam series quoted, but there is evidence in this case that

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MASSAN EXPLICA

# THE MEDICAL PROFESSION AND FIRST AID

By KHAN BAHADUR A. HAMID, A.O.St.J., D.P.H. General Secretary, St. John Ambulance Association (Indian Council), and Organizing Secretary, Indian Red Cross Society

An important aspect of the social function of medicine is popular health education which should aim at 'levelling humanity up to the

(Continued from previous page)

the whole population is suffering from a degree of iron deficiency anemia; therefore, as the figures are not based on a truly normal popula-

tion, this rule cannot be applied.

It is obvious that no hard and fast rule can be laid down. Whenever possible, it is best to examine normal individuals of the population concerned, and, where one can be certain of excluding most of the cases of sub-clinical blood dyscrasia, to calculate the range from the mean plus or minus twice the standard deviation. Otherwise, 80 to 100 cu. may be taken as the normal range for general use in India. That is to say, any figure below 80 cu. may be taken as indicating microcytosis and any above 100 cu. µ as indicating macrocytosis.

Similarly, for the mean corpuscular hæmoglobin, on the Calcutta figures the normal range should be  $28.53 \pm 2 \times 2.31 = 23.91$  and 33.14, or roughly 24 to  $33\gamma\gamma$ . This is in our opinion or roughly 24 to 33 $\gamma\gamma$ . This is in our opinion a good normal range for general use in India; any figure below  $24\gamma\gamma$  indicates hypochromia and any above  $33\gamma\gamma$  hyperchromia.

Finally, a good range for the mean corpuscular hæmoglobin concentration is 30 to 35; this is not based on any of the data quoted, for reasons into which we need not go now, but on our general experience.

outlook and attainment of scientific medicine, not levelling it down to the average human comprehension which would be only sovietization of medicine '.

The war has brought to the forefront the importance of the teaching of first aid and home nursing, which is education of the public in giving assistance in time of emergency. First aid is an art based on fundamental principles of practical medicine and surgery. This knowledge is imparted in order to enable trained persons to give skilled assistance in accidents and sudden illness and to prevent serious consequences before the arrival of the doctor or during transport.

The Order of the Hospital of St. John of Jerusalem has an old history, originating with the establishment of a hospital in Jerusalem in the third century A.D., when the healing art was under the influence of the church. Later, it became intimately associated with religious wars. In the latter half of the nineteenth century, the advent of scientific medicine weakened the control of the church on the one hand and witchcraft on the other, and placed the healing art on

a new pedestal.

It was at the International Conference of the Red Cross Societies held at Berlin in 1869 that the real beginning of the ambulance movement was made after the Franco-Prusian War of 1870, when it had become apparent that ambulance work in war could not be properly done unless it was properly organized in time of peace. In 1877, the St. John Ambulance Association was formed with this new outlook, for which Queen Victoria granted a charter in 1888. What has been done for field hospitals by Florence Nightingale has been done for ambulance work by the St. John Ambulance Association. In 60 years, its powers and organization have developed

Hæmatological values.

Sex	Locality	Num- ber	Mean corpus- cular volume	Standard deviation	Mean corpus- cular hæmo- globin	Standard deviation	Mean corpus- cular hæmo- globin concen- tration	Standard deviation	Authority
Male  "" Unspecified Females  "" "" Pregnant females. "	Calcutta Bombay Assam Cachar U. S. A. Britain Calcutta Bombay Delhi Assam Cachar Michigan Calcutta	30 121 24 25  128 101 100 ·20 25 50 64	90.49 87.08 * 71.29 84.93 87.00 86.00 86.82 88.53 * 85.64 * 77.30 82.49 86.30 86.83	± 7.90 ± 7.04 ± 10.78  ± 7.28  ± 7.70 ± 12.68 ± 10.8	28.53 30.01 * 23.93 25.14 27.5 29.5 27.42 29.06 * 28.76 * 24.50 23.42 	± 2.31 ± 2.31 ± 3.70  ± 2.89  ± 3.00 ± 3.10 ± 3.34	31.07 34.54 * 32.50 29.72 35.00 34.00 31.57 32.86 * 33.58 * 31.20 28.67 	± 1.20 ± 3.10 ± 2.94  ± 1.76  ± 1.70 ± 3.37 ± 2.13	Napier and Das Gupta, 1936. Sokhey et al., 1937. Napier and Das Gupta, 1936. Napier and Majumdar, 1938. Castle and Minot, 1936. Whitby and Britton, 1939. Napier, 1939. Sokhey et al., 1938. Benjamin, 1939. Napier and Bilimoria, 1937. Napier and Bilimoria, 1938. Rapier and Majumdar, 1938. Bethel, 1936. Napier et al. (unpublished). Bethel, 1936.

Calculated from data given, after applying factor × 1.09 to cell volume to allow for shrinkage, where the has not been done.

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steadily throughout the British Empire and Dominions, so that India, Canada, South Africa, Australia, New Zealand and most of the colonies have now their own splendid organization and are training thousands of men and women in first aid and ambulance work, home nursing and air raid precautions and anti-gas measures.

In Jerusalem the Order still maintains its institution which is a well-equipped ophthalmic hospital and is doing useful work among the poor of all creeds who suffer from the scourage of ophthalmia in Palestine and the neighbouring

countries.

The original emblem of the Order on its banner was a rectangular white cross on a red ground, the precursor of the Geneva Cross, the four arms of the cross being associated with the four cardinal virtues, viz, prudence, temperance, justice and fortitude. Later, in A.D. 1120 the. statutes formed for its governance included an ordinance which enjoined that members of the Order should wear a white eight-pointed Maltese cross on their robes, the points representing the eight beatitudes—qualities—which sprang from the practice of the cardinal virtues. The practice of the English Grand Priory of the Order is always to depict the eight-pointed white cross on a black ground, the white being a sign of purity of heart and the black of poverty, as the Order is for 'Service for the poor and suffering' which is given gratuitously in charity. The Order took as its arms the white cross on a red ground which become a sign of mercy as its members wore a bright red garment in times of war. In time of peace they wore a black robe and thus the colour of the background was changed. Each of the eight points of the emblem has now a secular significance, representing the qualities which are essential for the skilled first aider. These qualities are observation, tact, resource, dexterity, explicitness, discrimination, perseverance and sympathy.



The eight-pointed ambulance cross.

This is all interesting history. Whether the present-day physician is religious minded or not it is an indisputable fact that 'if there is any possible way of increasing the wisdom and ability of mankind it must be sought in medicine' and organized medicine claims organized professional service. This service is not confined to the bedside or the operation table. The modern doctor, if his education does not stand on the basis of scholarship, mathematics, astronomy and history, has still, in the kaleidoscopic changes of world events, opportunities for gaining in general knowledge and giving a wider outlook to his profession. The medical man's humanitarianism, if it is no longer a sentimental overflow of the heart or a religious conviction, should be a demand of his intelligence. Nothing should be too insignificant nor regarded as below his consideration, much less the subject of first aid.

The ambulance work of the Order whose foundation is laid in peace time becomes spectacular and arresting in time of war. No didactic training in first aid need be given to the medical student, but first aid for the public forms a special branch which the qualified doctor should not treat lightly, if he has to give correct education to the public, as the first aid is also based on scientific knowledge. All the details of first aid for the public have been worked out by a panel of experienced doctors, after considerable scrutiny and examination. 'Pressure points' per se may not form an important part of surgical anatomy, but they have an important bearing on the arrest of bleeding in the hands of a first aider whose knowledge of surface anatomy can be only skin deep, but whose correct aid at the opportune time saves life. Occasions have arisen when failing respiration has had to be restored on the operation table, but the process of artificial respiration on an apparently drowned person on the river side would be a different matter. There are standard bandages for the use of a doctor in his surgery but it will be necessary to improvise a triangular cloth with its point, base and sides out of the handkerchief for a road-side accident, and there is a technique for folding and using this bandage too.

Many intriguing questions arise in the mind of the highly technical professional. Can he teach fractures without the use of x-ray plates or pathological specimens? Is a patient to be carried on the stretcher with his feet foremost while going uphill? Why is the primitive long Liston still the splint of choice for the fracture of the thigh bone and the Thomas splint relegated to an appendix in the first-aid book.

(Answer: Because the individual first aider can improvise only the former in emergency and the latter is reserved for trained squads.)

It will be seen that the problem of first aid forms a special branch of study and the St. John Ambulance Association has considered the subject from all its aspects, which is well worth the

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attention of the doctor who is called upon to teach and examine a class. The work of the Ambulance Department of the Order does not end with the theoretical and practical teaching of first aid, home nursing, and air-raid precautions. It goes further and forms ambulance divisions of trained men and nursing divisions of trained women who are banded into uniformed and disciplined bodies for public service and who serve as auxiliaries to army medical and nursing services in time of war. Trained women who enrolled in the V. A. D. (Voluntary Aid Detachment) did useful work in the last war and they are enrolled now in the Voluntary Aid Service for nursing work. Trained men have formed ambulance corps. The Red Cross and the St. John Ambulance Association, the two recognized voluntary aid bodies in India, have formed a useful combination, the former taking up the financial responsibility and the latter providing personnel in whose training and practices the medical profession has ample opportunities for taking a conspicuous part.

The St. John Ambulance Brigade Overseas in India is in command of a chief commissioner at headquarters. There are fourteen brigade districts for administrative purposes, eleven of which correspond to the geographical distribution of provinces, each being in charge of the head of its civil medical department; two brigade districts in charge of their chief medical officers correspond to a couple of the largest railway administrations and one is in a State. Ambulance divisions of uniformed men trained in first aid consisting of about twenty members and officers parade regularly to keep themselves in form. Similarly nursing divisions of uniformed women qualified in home nursing as well meet regularly to refresh their knowledge of nursing and form work-parties for the preparation of hospital comforts for the sick and wounded, Younger people in schools and colleges form cadet ambulance and cadet nursing divisions. The formation of these divisions is growing apace. Each division has its own medical officer designated the divisional surgeon who helps to maintain its technical ability. Members and officers are given various awards and badges of proficiency. Recognition is also given for service and the most deserving ones of any creed are admitted to the Order of St. John, which is a coveted honour.

# Medical News

### ADRENALINE PREPARATIONS SOLD IN INDIA

QUITE a fair proportion of adrenaline chloride solution sold in India is below par in quality and sub-standard

This conclusion has been reached by the Biochemical

This conclusion has been reached by the Biochemical Standardization Laboratory of the Government of India as a result of the study of 30 samples of adrenaline chloride solution (1 in 1,000 strength) which have been tested biologically for their purity and potency in the course of an all-India survey of the quality of drugs and medicinal chemicals undertaken by the laboratory. Out of 30 samples analysed, as many as 12 (or 40 per cent) were markedly below strength (i.e., less than 75 per cent in potency of a known standard). Amongst this lot, seven samples showed a strength of less than 50 per cent. Two samples apparently contained only about 10 per cent of an adrenaline-like blood-pressure-raising principle. Only nine samples (or 30 per cent) were found to agree with the potency claimed by the manufacturers.

claimed by the manufacturers.

The specimens were secured from practically all over India through the courtesy of the heads of medical administrations of the various provinces. Some were secured from the open market by the officers of the laboratory. Although the total number is small the laboratory. Although the total number is small, the samples tested represent almost all the brands manufactured in India and abroad (England, Germany, France, Belgium, Switzerland), and available for sale in the Indian market.

The findings may therefore be considered as fairly representative of the conditions existing in this country so far as the quality of adrenaline solutions are

Glass containers.—The reasons for the poor quality Glass containers.—The reasons for the poor quality of the solutions are being further investigated in the laboratory. In the form of a 1 in 1,000 solution in which it is usually offered to the public, adrenaline, unlike other drugs such as digitalis, ergot, etc., does not rapidly lose its strength in the temperature and humidity existing in India. In the presence of alkali, however, adrenaline has been known to lose its strength, the deterioration being accompanied by a reddish or brownish discoloration.

Excess of alkali is sometimes present in the glass of certain containers (phials, ampoules, etc.) in which adrenaline has been found stored, and it is highly probable that this factor is at least partly responsible for the deterioration of the descriptions. for the deterioration of the adrenaline solutions contained. Apart from a strict watch (by biological assay conducted by technical experts) on the quality of adrenaline powders from which solutions are made, manufacturers in India who are usually dependent on the supply of class and the supply of cl the supply of glass containers from outside, would, therefore, do well to test the alkalinity of glass containers before putting in solutions of adrenaline chloride chloride.

Gravity of the problem.—The active principle of the medullary portions of the suprarenal glands, adrenaline is now one of the drugs in daily use in medical and surgical practice. Its most important actions consist of a constriction of the blood vessels with consequent rise of blood pressure sometimes with consequent rise of blood pressure, sometimes slowing of the heart, a direct stimulant effect on the heart muscle and relaxation of the bronchial muscles. In the prevention of local hæmorrhage, in local angesthesia and in such conditions as shock, heart failure and asthma, adrenaline is extensively employed and is the mainstay of the physician and surgeon. the mainstay of the physician and surgeon.

Adrenaline chloride solutions of very high strength or very poor quality may mean in some cases all the difference between the life and death of the patient. The necessity of a strict control of quality both in the interest of the patients to whom adrenaline is prescribed and of the doctor who expects results from his drugs is, therefore, apparent.

Standardization.—The standardization for the test made in the laboratory was carried out by the accepted biological method of comparing the 'pressor solution with that of a known standardization for the test biological method of comparing the 'pressor solution with that of a known standardization of decerebrated tion with that of a known standard in a decerebrated bu-

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and pithed cat. This method of assay is difficult and requires considerable experience but if carefully conducted, it is capable of yielding results accurate to within 10 per cent of the standard.

within 10 per tent of the standard.

A chemically-pure, natural, lavo-rotatory brand of adrenaline powder with an optical rotation of -50° to -53° in a 4 per cent solution of the normal hydrochloric acid which was obtained from the British Drug Houses and certified by chemical and biological assay as up to proper standard, was used as the reference standard. Potency ranging between 90 to 110 per cent of the standard has been taken to be within the limits of allowable variation and has been declared as equivalent in potency to the reference standard. Samples not falling within this range have been declared as of poor quality and not suited for therapeutic use in the dosage ordinarily prescribed by physicians.

BIOCHEMICAL STANDARDIZATION LABORATORY (CALCUTTA).

#### CHOLERA VACCINES ON THE MARKET

How necessary it is that those who carry out inoculation against cholera with vaccine purchased in the open market, should have samples tested periodically to ensure that they are capable of giving protection and are sterile and safe for use, is revealed by a test lately made at the Central Research Institute, Kasauli. Certain samples of cholera vaccine manufactured commercially and supplied to a Public Health Department in India, were examined at the institute, and it was found that true cholera strains had not been used in the preparation. The sterility test also showed that the vaccines were contaminated and, therefore, not fit for use. It is possible that an appreciable number of commercially-produced vaccines on sale are of a similar type.

The value of inoculation against cholera is now generally recognized, but it is not sufficiently realized yet that, to be effective, the vaccine should be of good quality and be prepared from the genuine cholera organism. The view of the cholera advisory committee of the Indian Research Fund Association, which was accepted by the medical research conference, is that no protection against cholera can be expected from vaccine not prepared from strains of the true organism.

Recent research work, under the Indian Research Fund Association, has thrown new light on the nature of the cholera organism. It has been shown that there are many organisms in nature which resemble the

cholera organism, but do not cause the disease.

To ensure that vaccine is made from the correct strains, it is desirable that strains tested and issued by contains. by certain specified laboratories, which have been continuously engaged in the study of the cholera vibrio should be used. The Directors of the Central Research Institute, Kasauli, the Calcutta School of Tropical Medicine and the King Institute, Guindy, have expressed their willingness to issue suitable strains to all laboratories, including those of commercial firms, for this purpose for this purpose

The cholera advisory committee have made certain recommendations on the technique of manufacture of cholera vaccine and the strains to be used, details of which may be had from the office of the Public Health Commissioner with the Commissioner wit Commissioner with the Government of India.

# ANATOMICAL SOCIETY OF MADRAS

'A MEETING of the members of the staff of the anatomy departments of the Madras Medical College and the Stanley Medical College was held in the Central Institute of Anatomy Madras Medical College, Central Institute of Anatomy, Madras Medical College, on the 6th instant at 5 p.m. In the course of the meeting. Roshy of Madras—was formed. Professor P. K. Koshy, B.A., M.B., F.R.C.P.(E.), was elected president, Dr. O. Nayinan, M.B., B.S., vice-president and Dr. U. V. Nayak, M.B. Dr. O. Dr. Nayak, M.B., B.S., Ph.D. (Lond.), honorary treasurer and secretary.

# PLANT PRODUCTS OF COMMERCIAL VALUE

Efforts were made throughout the year to secure specimens of medicinal plant products, plant materials used as vegetable insecticide, cereals, pulses, oil-seeds, commercial timbers, samples of hand-made and machine-made paper of different qualities, as are likely to be of public interest, says the annual report of the to be of public interest, says the annual report of the Botanical Survey of India for 1938-39.

The specimens collected have mostly been exhibited in the gallery of the industrial section of the Indian Museum, Calcutta. Cottage industries are a great

centre of attraction to the visitors to the museum.

The different stages of the manufacture of paper are explained by charts, with finished products and raw materials, namely, bamboo, munj, ramsar, ulla grass, sabai or bhabar grass and the various chemicals used. There are some exhibits which show how ten pounds of bamboo treated with chemicals, one can have 4.2 pounds of finished paper. Samples of hand-made paper collected from Bengal, Nepal, Manipur, Kashmir, Bombay and Federated Shan States are on show. Some of the samples are strong enough to last over 1,000 years and are used for important and valuable documents.

#### DRUG EXHIBITS

Amongst the exhibits there are 25 well-known commercial drugs, namely, aconite, artemesia (kirmala), podophyllum (papra), taraxacum, colchicum, digitalis, belladonna, jurinea (dhup), rheum (revandchini), hyoscyamus (khorasani ajowan), valerian, etc., which were collected from Kashmir

In a special show-case, with electric arrangements for illumination, is housed a set of commercial timbers from Dehra Dun with their magnified microphotographic slides.

To increase their popular appeal, exhibits in the industrial section are being provided with new and up-to-date description labels and charts.

The industrial section has, in addition, been collecting information from various sources on many commercially important botanical products. Detailed information has been collected on hand-made paper, Kashmir drugs and vegetable insecticides and given publicity. Many correspondents in India and abroad have been supplied information on various economic plant products. Students and teachers, who visited the museum, were given all attention and help. Specimens were procured for and supplied to many scientific workers.

Over Rs. 3,00,000 was realized from the sale of Government of India quinine. The year opened with a stock of 112,564 pounds and closed with a balance of 97,071 pounds. The closing balance of bark was 256,106 pounds.

Distribution of quinine from Government of India stocks to the Punjab, North-West Frontier Province, Baluchistan and Ajmer-Merwara restricted and the provinces were asked to make their own arrangements. With the end of the year, supply to the provinces, except the centrally-administered areas of Ajmer-Merwara and Baluchistan, was totally stopped.

In systematic botany some 2,000 plants specimens have been collected and added to the herbarium of the Royal Botanic Gardens, Sibpur. Nearly 3,000 specimens have been identified, for a large number of correspondents, the largest collections among those being from Sikkim, Balushistan, Dehra Dun, Karachi and Burma. A large number of duplicate specimens has been distributed to sourced ineticate. specimens has been distributed to several institutions in India and abroad and more than 3,000 sheets have been acquired in exchange, and about 4,000 sheets have been added to the herbarium.

The herbarium has been of considerable assistance to a number of distinguished botanists, both Indian and foreign, who came to visit and work in it for identification and confirmation of doubtful plant specimens of different localities. Mention may be made of the investigations on poisonous plants of India conducted by the assistants of Colonel Chopra for which all possible facilities and assistance were given.

# BENGAL COUNCIL OF MEDICAL REGISTRATION

(Abstract of the Proceedings of the Council of Medical Registration, Bengal, at their meeting held on 17th January, 1939)

The term of members under clauses (f) and (g) of section 4 of the Bengal Medical Act, having expired, since the date of the last meeting, the following gentlemen were elected at the election held in the

Dr. S. K. Mukherjee, D.O., D.O.M.S., F.R.C.S.
Dr. S. C. Sengupta, M.B., Ch.B., M.D., F.R.C.S.
Similarly the following gentlemen were elected under

clause (f):— Dr. Taraknath Ghosh, M.B.

Dr. Kalikinkar Sengupta, M.A., B.Sc., M.B., D.T.M. Dr. Santoshkumar Chatterjee, M.B., F.R.C.S.

Dr. Basantakumar Ghosh, M.B., D.T.M.
2. The revised regulations for the Licentiate Examination, raising the course to 5 years and requiring I.Sc. as the preliminary qualification which were recommended in March 1937 were awaiting Government orders pending the views of the All-India Conference at Delhi on Medical School Education. The Council have proposed a deputation to wait on the Hon'ble Minister in charge to explain the urgency of the question.

3. The budget estimates for 1939-40 approved by the Council showed that against an expenditure of Rs. 14,535 the receipts from registration fee, etc., would amount to Rs. 8,250. The Council therefore needed a Government grant of Rs. 6,280 or at least Rs. 6,000, as against Rs. 4,500 hitherto taken as the normal grant. A loan of Rs. 2,000 taken from the Faculty in 1936-37 would still remain unpaid. At their previous meeting the Council had proposed to Government to receive a deputation from them to explain the financial

4. Dr. B. C. Ray, M.D., M.R.C.P., F.R.C.S., was elected as representative of the Medical Council, in the Bengal Nursing Council.

5. The following members were appointed to 15.
the Penal and Ethical Cases Committee:—
(1) Lieut-Col. T. C. Boyd, F.R.C.S., D.P.H., I.M.S.
(2) Dr. B. C. Ray, M.D., M.R.C.P., F.R.C.S.
(3) Dr. S. K. Mukherjee, D.O., D.O.M.S., F.R.C.S.
(4) Dr. J. C. Chatterjee, L.M.S. The following members were appointed to form

(5) Dr. A. D. Mukherjee, L.M.F.
6. The following members were appointed for the School Inspection Committee:—

Lieut.-Col. T. C. Boyd, F.R.C.S., D.P.H., I.M.S.
Dr. S. K. Mukherjee, D.O., D.O.M.S., F.R.C.S.
Dr. K. S. Ray, M.A., B.SC., M.B., Ch.B.
Dr. J. C. Chatterjee, L.M.S.

(5) Dr. A. D. Mukherjee, L.M.F.

Dr. A. D. Mukherjee, L.M.F.

The following members were appointed for the Examination (Faculty's) Inspection Committee on behalf of the Council:—

(1) Dr. S. K. Mukherjee, D.O., D.O.M.S., F.R.C.S.
(2) Lieut-Col. B. G. Mallya, M.D., F.R.C.S., I.M.S.
8. The Council at their previous meeting had resolved that in the present conditions of the Ronaldshay Medical School (Burdwan) and Lytton Medical School (Mymens Both) their affiliation could not be continued further Both not be continued further. Both are government schools, and on intimation from the Surgeon-General that action was being taken to remove the main defects, the Council extended the affiliation by one year, and in the meantime a further report from the inspection committee as to the progress made would be exemited. mittee as to the progress made would be examined.

(Abstract of the Proceedings of the Bengal Council of Medical Registration, at their meeting held on the 8th August, 1939)

1. The Council considered that it was desirable that the country of qualification particularly when the qualification had been obtained from a foreign country should be mentioned along with the abbreviation used for medical qualifications, so that the public might not be misled and they expected that a convention

would be gradually established by registered medical practitioners if they follow this practice.

2. The Council decided that Government be moved.

to obtain legal opinion as to whether they could under the authority of section 18 (a) examine the medical qualifications of a foreign country which was not covered by the British Medical Acts.

3. Government Notification announcing the election of Dr. B. C. Ray, M.D., M.R.C.P., F.R.C.S., as a member of the Bengal Nursing Council was recorded.

4. The following resolution of the standing inspection committee was adopted:-

Resolved—that the committee recommend that no action should be taken for the inspection by them of medical schools outside Bengal; and that where any such institution desires to continue its recognition in Bengal, it should be sufficient that the institution is recognized by a Medical Council in any province in India, with which this Council has reciprocity of registration.

5. Lieut.-Col. J. C. De, I.M.S., was appointed a member of the standing inspection committee and the Penal and Ethical Cases Committee in place of Colonel Boyd, I.M.S., transferred.

The Council recorded the report by the registrar that Biseswar Das, a compounder who had given a medical certificate posing as a registered medical practitioner, had been prosecuted under section 29 of the Bengal Medical Act, 1914, and had been convicted and sentenced to pay a fine of Rs. 15 in default to undergo simple imprisonment for two weeks.

### POST-GRADUATE STUDY IN GREAT BRITAIN

Women medical students and doctors who are planning post-graduate studies abroad are invited to correspond with the Chief Medical Officer, Women's Medical Service, Countess of Dufferin's Fund Office, Viceregal Estate, Simla (summer), Red Cross Building, New Delhi (winter), from whom advice can be obtained before leaving India about the reviews diplomes and before leaving India about the various diplomas and courses of study available, the qualifications needed for each, and in general about facilities for residence and

study abroad.

In England the services of the High Commissioner

for India are available for similar advice.

Applications should be made to the High Commissioner's Education Department which is assisted in this matter, where necessary, by the Countess of Dufferin's Fund Medical Adviser in London.

Students are strongly advised not to leave India without assurance that they are qualified for admission to the examinations they intend to take.

(Sd.) G. STAPLETON, Chief Medical Officer, W. M. S. As

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# THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

THE following students are declared to have passed the D.T.M. Examination, Session 1939-40:-

- (Arranged in alphabetical order)
  Ahmad Husain, M.B., B.S. (Punjab), private practitioner.
- (Cal.), Assistant Surgeou.
- Anwar Ali, M.B. (Cal.), Assistant Government of Bengal. Netai Charan Banerjea, M.B. (Cal.), private
- practitioner.
  Amiya Ratan Basu, M.B. (Cal.), private practi-
- Padma Nava Bose, M.B., B.S. (Punjab), private
- Amalendu Chakrabarty, M.M.F. (Cal.), private practitioner
- Biharilal Chaudhuri, M.B. (Cal.), private practitioner.
- Pran Nath Chhuttani, M.B., B.S. (Punjab), Private practitioner.

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9. Ishwar Chander Chopra, L.R.C.P., M.R.C.S. (Lond.), private practitioner.

. 10. Barbara Guy Courtney, M.R.c.s. (Eng.), L.R.c. (Lond.), L.T.M. (Cal.), private practitioner.

Nirmal Chandra Das, L.M.P. (Assam), Assistant Medical Officer, Daisajan Tea Estate, Assam. Nar Narain Dikshit, M.B., B.S. (Lucknow), private practitioner.

Jethalal Gordhandas Gandhi, L.C.P.S. (Bombay), 13.

private practitioner.
Santosh Kumar Ghosh, M.B. (Cal.), Clinical Assistant, Medical College Hospital, Calcutta. 14.

15. Jyoti Prakash, L.M.P., L.C.P. & S. (Bombay), L.T.M. (Cal.), Pathologist, Civil Hospital, Ajmer.

16. Dinkar Ramrao Kaikini, M.B., B.S. (Bombay), private practitioner.

17. Sitaram Subrao Kulkarni, L.C.P.S. (Bombay), L.T.M. (Cal.), Medical Officer, P. G. Singhanee Hindu Hospital, Bombay.

18. Pallathucheril Varkki Kurian, M.B., B.S. (Madras), private practitioner.

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# Current Topics

# The Sulphapyridine (M. & B. 693) Treatment of Pneumonia in Children

By C. H. SMITH, M.D.

and

R. L. NEMIR, M.D.

(Abstracted from the Journal of the American Medical Association, Vol. CXIII, 18th November, 1939, p. 1857)

THE majority of the patients had lobar pneumonia (seventy-nine of the ninety-three), distributed from 2 months to 13 years of age. There were twenty-nine patients under 2 years with lobar pneumonia and fifty over 2 years. All of the eleven patients with broncho-

pneumonia were under 2 years of age.
Sulphapyridine was given by mouth, in most cases Sulphapyridine was given by mouth, in most cases crushed and mixed with cereal, apple sauce or fruit juice. It was usually given shortly after a meal to minimize the possibility of nausea or vomiting. In the early cases 0.2 gm. per kilogramme of body-weight (1½ grains per pound) was given on the first day, and half this amount on the subsequent days. We soon found that equally prompt defervescence was observed with three-fourths of this dosage in children over 2 years. The infants, however, seemed to require the original dosage, and this was continued for them. No child received more than 4.5 gm. a day, and the average total amount given to a child was 5.48 gm. The average total dosage for an infant under 2 years was 200 The average total dosage for an infant under 2 years

was 3.99 gm.

Half of the patients were treated for only two days and 75 of the patients were than three days. The and 75 per cent for not more than three days. The average duration of treatment was 2.6 days. It is our experience that if authors wilding effects the course of experience that if sulphapyridine affects the course of the pneumonia it does so within eighteen to thirty-six hours. In the first few cases treated it was given for from five to six days after the crisis, but the prompt fall of temperature after the drug is begun led us to shorten the time of administration. In the larger part of this series the drug was continued for only eighteen of this series the drug was continued for only eighteen to twenty-four hours after the crisis. No definite recurrences of pneumonia have been noted. Five patients

had subsequent short rises of temperature, probably not true relapses of pneumonia.

Blood sulphapyridine determinations were done on many but not on all patients. The concentration was found to vary widely with the same dosage of drug, from less than 1 mg. to 12 mg. per hundred cubic centimetres. Three patients whose concentration was 0.8 mg. per hundred cubic centimetres had a crisis completed within eighteen hours after the drug was given. The average blood sulphapyridine determinagiven. The average blood sulphapyridine determina-tion was from 2 to 4 mg. per hundred cubic centimetres, and with this level in most cases prompt crisis was noted.

### UNFAVOURABLE REACTIONS

The most frequent reaction was vomiting, usually of only one or two doses occurring in 15 per cent of the This symptom was never severe enough to topping the drug. Vomiting can be greatly require stopping the drug. reduced by giving the sulphapyridine with food or directly after meals, a precaution which is often neglected in hospital practice. None of the patients became cyanotic from the drug, although several were cyanotic when it was first given. Extreme restlessness and delirium were observed in four patients, one of whom had a blood sulphapyridine concentration of 12 mg. per hundred cubic centimetres, the highest in our series. This baby had a peculiar agitated expression and constantly three himself about. His extreme sion and constantly threw himself about. His extreme restlessness required the use of restraints to prevent falling out of bed. This agitated restlessness is not a part of any pneumonia picture. All four of these patients presented an alarming state; they had a peculiar intense pallor, although they were not anæmic. They were improved by sedatives (phenobarbital), by a large amount of fluids and by discontinuing the drug for one or two doses. Two of these babies were placed in oxygen tents without improvement of the nevyous in oxygen tents without improvement of the nervous symptoms. A transient mild hæmaturia was observed in one patient. This child had received only 0.12 gm. per kilogramme of sulphapyridine; hæmaturia appeared on the third day of treatment and cleared within a few days. It must be pointed out that hæmaturia occasionally occurs in pneumonia without the use of

were. toxic symptoms sulphapyridine. No other

#### RESULTS

The prompt and consistent precipitation of crisis following the oral administration of sulphapyridine has been reported by many observers, and our experience is no different. This reaction occurred within eighteen to twenty-four hours in sixty-nine of the seventy-nine patients with lobar pneumonia. Of course, it is possible that the drop in temperature of some of the patients tion cannot account for all the reactions, particularly in those treated very early in the disease. Many of the patients treated on the eighth to the eleventh day were acutely ill with type XIV pneumonia, in which the average duration is from eight to fourteen days.

It has been stated that, although sulphapyridine provokes a crisis, the disease runs its course, and the

consolidation does not resolve sooner than it would have done if untreated. This suggestion is contrary to our experience. The x-ray shadows and the physical signs begin to clear at once just as they do after a

The three patients with lobar pneumonia who failed to show the typical response to sulphapyridine were all infants under 2 years of age, all severely ill. It is possible that the sustained temperature in the first one of these patients was a febrile evidence of sulphapyridine intolerance or intoxication, since this baby had other signs of reaction, namely extreme restlessness, delirium, pallor and marked anorexia. His blood sulphapyridine determination was 12 mg. per hundred cubic centimetres. The second patient is remarkable only because he required forty-eight hours' therapy to produce a crisis. The third baby had pneumonia three times previously at Bellevue Hospital, some of these atypical pneumonia. We cannot explain his unusual reaction

to sulphapyridine.
In five cases of lobar pneumonia, although the usual reaction occurred after sulphapyridine, secondary short febrile rises occurred. It has been suggested that the bacteriostatic action of sulphapyridine may produce improvement for a short time and then be followed by a relapse. There were only five patients whose temperature charts might be so interpreted. Only one of these cases clinically appeared like a pneumonia during these cases clinically appeared like a pheumonia during the second temperature rise which yielded promptly to renewed treatment. The dosage of sulphapyridine was probably inadequate in case 5, but readministration of the drug was followed by prompt crisis. The other three patients had no new signs of pneumonia. One of these received no more drug, and the fever subsided just as promptly as in the cases in which it was given, so that it is not certain that any patients had true relapses. Short febrile episodes are often seen in hospital patients from insignificant causes. These three patients may all have had transient fever not associated with pneumonia. Roentgenograms in all five cases showed clearing pneumonias and no new consolidation. It is noteworthy that four of the five patients had pneumococcus type XIV pneumonia, a disease known for its severity. It is suggested also that the type XIV pneumonia may require a somewhat greater dosage than the other pneumococcic pneumonias.

In eleven cases of true broncho-pneumonia we have failed to observe the same dramatic, prompt response The temperature of the patients with bronchopneumonia remained elevated, and they seemed only slightly improved. Our series of this form of pneumonia this year is small, however. Four of the eleven patients died, approximately the average mortality rate for broncho-pneumonia during the past eight years. A much longer time will be needed to evaluate sulphapyridine therapy in this form of pneumonia. Kohn reports no effect on broncho-pneumonia in his experi-

ence at the Willard Parker Hospital.

One patient clinically thought to have bronchopneumonia died and at autopsy was found to have lobular pneumonia, probably from aspiration. The walls of the bronchi were normal. This 6½ months old

baby was admitted to the hospital for a diarrhea from baby was admitted to the hospital for a diarrnea from which he was recovering when he developed pneumonia. Type XIX pneumococcus was found. The baby was Type ATA phedmixth sulphapyridine but died within thirty-six hours after the onset of the pneumonia.

thirty-six hours after the onset of the pheumonia.

There was one death among the seventy-nine patients with lobar pneumonia. This severely ill 16 months old with lobar pneumonia on the third day after additional and the seventy-nine pheumonia. with lobar pneumoma. The third day after admission baby died suddenly on the third day after admission baby died suddenly on the third day after admission to the hospital. A roentgenogram taken the day before death showed a pyopneumothorax (not diagnosed clinically), which was probably responsible for the death. No autopsy was obtained.

Only one patient developed empyema, an infant with type I lobar pneumonia. He developed physical signs, and a roentgenogram indicated suppurative pleurisy.

on pleural tap 2 c.c. of thick pus was removed, from which type I pneumococcus was cultured. No further pus was ever found and the patient promptly recovered.

pus was ever found and the patient promptly recovered. This abortive course of empyema has been rarely encountered in our many years of observation of empyema, especially that following type I pneumonia. Pneumococcic bacteremia was found in only one patient, a boy of 8 years, with type I lobar pneumonia. His defervescence occurred within eighteen hours in the typical manner. The drug was cut off after thirty-six beauty and the report of the blood stream investors. hours, and the report of the blood stream invasion was obtained after the drug had been discontinued. Even with this small amount of therapy, the blood stream was sterile. As a precaution the drug was readministered for twenty-four hours, but all further blood cultures were sterile. Streptococcus viridans was found in two blood cultures from a patient with bronchopneumonia. The blood cultures were sterile after several days' treatment with sulphapyridine, and the patient recovered.

#### COMMENT

The consistent prompt crises observed in our patients with lobar pneumonia following the oral use of sulphapyridine is convincing to us that the drug is very efficacious in treating pneumococcic pneumonia (and perhaps also that due to the streptococcus). But the value of a therapeutic agent in pneumonia cannot be established in one season's time, since pneumococci are known to vary in their distribution and virulence from year to year. It may be that results will be less good in more serious epidemics.

In the present season we have had a lower percentage of type I pneumonia (10.9 per cent for the present year as compared to 17.8 per cent average for the past six years). There were probably more mild cases this season than usual, although many patients were very severely ill

The failure of broncho-pneumonia to respond favourably to sulphapyridine may be explained on the basis of etiology, since the bacteriology is variable and often no pneumococci are found. If a filtrable virus is the etiologic agent of bary here. etiologic agent of broncho-pneumonia, as has been suggested by various workers and by some experimental work with animals the different work with animals, the explanation for the different reactions of these patients to the drug is probably indicated. Sulphapyridine has not been especially useful for discount.

useful for diseases due to filtrable viruses.

For the older child sulphapyridine may well be the answer to the treatment of lobar pneumonia in the great majority of cases. In this age group (2 to 13 years) pneumonia is a milder disease with a much lower incidence of bacteromic and doubte then in adults. lower incidence of bacteremia and deaths than in adults. Even though the death rate in children may not be greatly affected, since it is always the shortening greatly affected, since it is already low, the shortening of the disease and the avoidance of complications justify the use of the drug. There may always be some patients who will require another antipneumon. some patients who will require specific antipneumococcus serum therapy as well as the bacteriostatic agent
sulphapyridine. Infants who will as the bacteriostatic agent sulphapyridine. Infants who are debilitated, chronically ill or anæmic and who may be unable to produce their own immune bodies may need specific serum as well as sulphapyridine. The necessity for obtaining a well as sulphapyridine, preferably before chemotherapy pneumococcus typing, preferably before chemotherapy is given, is clear. If sulphapyridine is not effective in the usual time, from eighteen to twenty-four hours, specific serum may be given without delay if typing

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has already been done. In comparing results from different clinics with sulphapyridine in pneumonia, it is important to compare the results with reference to the types of pneumococci. It is known that the duration, types of and fatality of pneumonia is directly associated with the pneumococcus types.

We wish to reiterate that it is not necessary to continue sulphapyridine for many days in the fear of a relapse. In this series the drug was given only 2.6 days on an average. If the few early cases are excluded, this time drops to 2.3 days. The average total amount was 3.99 gm. for infants under 2 years and 5.48 gm. for patients 2 years of age and over. The largest amount given to any patient was 13.25 gm. The advice to try to stop the drug after 300-450 grains (20-30 gm.) have been given seems unwise in suggesting that these large amounts are usually needed. Sulphapyridine may be a poisonous drug in some cases, as is indicated by the reports of cyanosis, hæmaturia, leukopœnia, delirium, liver damage and even death associated with the use of the drug. We believe that sulphapyridine should be given no longer than is necessary to effect a crisis and should be stopped very soon thereafter. To continue medication longer is unfair to the patient, just as it is with any drug having a cumulative poisonous action. The fact that we have observed no true relapses and have had no toxic symptoms of importance indicates the value of a wider trial of the small dose and short administration. Others have produced a crisis by one day's treatment and even by a single large dose.

#### RESULTS

1. From January to July 1939, ninety-three patients were treated with sulphapyridine; seventy-nine with lobar pneumonia, eleven with broncho-pneumonia, one with lobular pneumonia and two whose pneumonia was classified as 'subacute pneumonia'.

2. In broncho-pneumonia there was no apparent effect on the course in any of the eleven patients, four

of whom did not survive.

3. In uncomplicated lobar pneumonia with small dosage, for two or three days only, a crisis occurred within eighteen to twenty-four hours in seventy-four of the seventy-nine cases. In the five other cases crisis occurred in forty-eight hours. One death occurred from pyopneumothorax. The short duration of therapy is emphasized not only because of its success but also because of the very few untoward reactions observed.

# Canned Foods in Relation to Health

By SIR WILLIAM SAVAGE, B.Sc., M.D. (Lond.) (Abstracted from the *Lancet*, Vol. II, 4th November, 1939, p. 991)

### NUTRITIVE PROPERTIES

REDUCED to essentials, the canning process involves preliminary treatment to select the parts of the food which are suitable for canning and in some instances to blanch to blanch, soften, or otherwise prepare the food and a subsequent heat treatment in sealed containers to subsequent heat treatment in sealed containers render the food safe for storage for long periods and subsequent usage after preparation. All canned foods are therefore subjected to treatment, particularly by heat, and it is possible that this may affect the nutritive qualities of the food so treated.

On the quantitative side there is no evidence that

On the quantitative side there is no evidence that foods so treated have their total nutritive value affected. affected in any way. Indeed from this point of view they possess considerable advantages due, on the one hand, to the fact that hand, to the fact that to give a successful commercial product the foods must be utilized by the canner in an extreme of the control of the other hand, extreme state of freshness and, on the other hand, that the preliminary treatment is calculated to make the whole of the food canned available as food without any wasters.

Qualitatively the position is not quite so simple, for theoretically might affect the mineral balance and the vitamin

content. The question of mineral balance really only arises as regards milk, and there is no evidence that it is affected. Henry and others, who studied this and other questions for dried and evaporated milk, state no significant difference was found between the biological values of the proteins (nitrogen) of the processed milks', and 'as regards biological value and true digestibility the figures show very slight reduction but not of statistical significance'.

Our knowledge of vitamins and the conditions under which they are destroyed or reduced in foods has been greatly augmented in recent years, so it is now possible to furnish reliable data as regards their presence in

canned foods.

Vitamin A.—Both this vitamin and carotene are insoluble in water and stable even at high tempera-tures, provided there is an absence of oxygen. Vitamin A is much more sensitive to oxidation than to the degree of heat. Experimental work confirms that canning is not destructive to this vitamin and is definitely less prejudicial than ordinary cooking.

Vitamin-B. complex is very heat stable; but, since it is water soluble, loss is to be anticipated the preliminary washing (for fruits and vegetables); but this applies even more so to ordinary cooking. The experimental work done is not very large; but as regards riboflavin, probably the least stable member of the complex, no loss has been observed in several foods, including evaporated milk.

Vitamin D has a high stability to heat, and experimental work confirms that no destruction takes place

during canning.

Vitamin B, is comparatively little affected oxidation and possesses considerable resistance to heat in an ordinary acid medium. On the other hand, it is water soluble. Preparation processes, whether for ordinary domestic cooking or for canning, may cause considerable loss of this vitamin. Roscoe found that about half the B<sub>1</sub> content of spinach went into solution in the cooking-water during a period of 15 minutes' boiling, and Baker and Wright show considerable cooking loss with some foods. Apart from loss in preparation the rather scanty experimental evidence suggests that the destruction of vitamin B<sub>1</sub> in the canning is usually small, but that there is some. Except for milk, there do not appear to be any reliable comparative figures of the vitamin-B<sub>1</sub> content of the same food before and after canning. For milk Henry found little or no destruction with dried milks but considerable loss with appropriated will. with evaporated milk.

Vitamin C is readily affected by heat, by washing, and by storage. Numerous investigations have been made on the influence of these factors, particularly as regards ordinary cooking. The vitamin-C content of fruits and vegetables shows considerable variations even with the same food. Further, the content begins to diminish from the time of picking, and here canned foods have a definite advantage as economic factors necessitate the shortest possible time between picking

and canning.

Very few papers give comparative figures for the vitamin-C content of the same foods raw, cooked, and Valuable studies have, however, been made by

Oliver; she concluded:—
'Part of the vitamin C content is extracted from plant tissue when it is heated in liquid as in cooking and canning. At the end of the normal process in each method the ascorbic acid is frequently evenly distributed throughout solid and liquid. The per-centage of ascorbic acid destroyed in both cooking and canning is comparatively small, but considerable quantities are lost to the consumer when the water used for cooking vegetables is discarded. Vegetables after storage may contain appreciably less vitamin C than the fresh material after canning. . . The ascorbic The ascorbic acid content in canned material tends to fall on storage,

but for all practical purposes the loss is not great.'

The much higher content of ascorbic acid in raw fruits and vegetables is shown in the table below.

Henry and others experimenting with evaporated milk, found a loss of 30 per cent of vitamin C. Numerous other examinations of canned fruits and

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vegetables, particularly tomatoes, show a material retention of vitamin C adequate for them to serve as valuable sources of this vitamin. This particularly applies if the canning has been comparatively recent. Daniel and Rutherford found that, whereas fresh tomato-juice contained an average of 0.20 mg. of ascorbic acid per g., there was a loss of about 12 per cent on canning and a further loss of 10-13 per cent on storage for six months. This still left a considerable amount of ascorbic acid. The practical experience of the French Mission to Greenland in 1932-33 was that the fifteen men lived for thirteen months on tinned foods, almost entirely without fresh foods, and no foodpoisoning or nutritional defects resulted. The tinned fruits and vegetables yielded sufficient vitamin C to prevent scurvy.

TABLE

Amounts of raw, cooked, and canned fruit and vegetable required to give 30 mg. of ascorbic acid

Fruit or vegeta	Raw	Cooked	Canned	
Black currants Gooseberry Spinach Broad bean Pea Carrot		1-3 oz. 21-33 ,, 1-31 ,, 33 ,, 31-51 ,, 13-106 ,,	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1-11 oz. 31-12 oz. 31-12 41-81 6-8 31-13 26-34

The commonsense way of looking at the question is to realize that all cooking processes, whether domestic or canning, cause material loss of vitamin C and that storage causes additional loss. Modern canning methods are designed to minimize this loss, so that it is better controlled than domestic cooking, and the loss may well be less. If we require a high intake of vitamin C, we have to rely on fresh fruits and vegetables to supply it, for all cooked foods are inferior sources. For a sufficiency level many canned fruits and vegetables have an adequate amount. It cannot be considered as in any way prejudicial to canned foods that being cooked foods they share the limitation of all cooked foods as inferior to raw foods as sources of vitamin C.

The nutritive side of canned foods has also been studied experimentally. Godden and Thomson fed some 1,700 rats in four successive generations over a period of eighteen months in comparable groups, one entirely on canned foods and the other on fresh foods cooked as in an ordinary household. Their finding on the rats fed on canned food was as follows:—

'Their performance in respect of breeding, growth, and composition of the body as a whole as well as of the bones and teeth separately was in all respects.

Their performance in respect of breeding, growth, and composition of the body as a whole as well as of the bones and teeth separately was in all respects comparable with that of similar rats fed on a diet of corresponding foods, shop purchased or locally grown and cooked under household conditions. In both cases the performance was up to the average for the rats in the stock colony on what is considered to be an optimal diet.

Their results confirm similar feeding experiments carried out in America by Kohman et al. over a period of four years. They also found canned foods superior as a source for calcium.

The extremely long periods in years over which canned foods can remain in good condition is shown by the interesting examinations summarized by Drummond and others.

#### GENERAL CONCLUSIONS

(1) On the nutritive side, canned foods compare favourably with fresh foods, when allowance is made for the fact that the former are already prepared for use and the latter are subjected to any losses which may take place in domestic preparation and cooking. These facts apply qualitatively as well as quantitatively. So much attention in modern canning practice is paid to the preservation of the vitamins that, as

regards vitamin-content, they are not, in general, inferior to the same foods after ordinary cooking. In some cases they are definitely superior. The view that canned foods are devitalized foods (whatever that may mean) is not supported by nutritional research.

may mean) is no starper and research.

(2) On the chemical side there is no evidence that tin- or lead-poisoning now ever results from the consumption of canned foods. Faulty procedures may occasionally lead to considerable quantities of tin being present, and, since we have not sufficient information to say that chronic ill effects might not possibly occur, it is sound policy to take measures to reduce the tin-content to as low a figure as possible. There is no evidence that any such chronic ill effects have ever resulted.

(3) Canned foods share with all other foods the risk of being a vehicle to cause food-poisoning. From a study of all the data it can be definitely stated that canned foods are now considerably less liable than ordinary foods to be a source of food-poisoning. This is conspicuously so for the more dangerous outbreaks associated with the presence of living bacilli. Liability to cause the milder outbreaks of toxin type still exists but is being reduced, and even for this type their incidence, bulk for bulk, is less than that of other foods.

(4) As regards our food-supply generally, canned foods can be accepted as a safe and convenient source and one without any special hazards, nutritional, chemical, or bacterial. Their relative cost, as compared with fresh foods, is outside the scope of this article. The chief drawback to their usage is the liability for the discarded tins to provide a serious problem in scavenging, especially in rural areas.

# The Value of Colloidal Aluminum Hydroxide in the Treatment of Peptic Ulcer

By E. E. WOLDMAN and

C. G. POLAN

(Amer. Journ. Med. Sci., Vol. CXCVIII, August 1939, p. 155. Abstracted—International Medical Digest, Vol. XXXV, October 1939, p. 199)

'An experience in the management of peptic ulcer by means of the continuous administration of colloidal aluminum hydroxide extending over three years, and including the treatment of 407 patients, furnishes convincing evidence that this method has definite advantages over other forms of therapy in this disease. The treatment represents no radical departure from previous methods, but controls gastric acidity more effectively because of the use of a more efficacious neutralizing agent, which is administered continuously instead of intermittently. By the continuous administration of colloidal aluminum hydroxide, both day and night, the delicate granulation tissue formed in the process of healing is not destroyed by accumulation of acid. In addition to its exceptional neutralizing effect, colloidal aluminum hydroxide appears to promote healing by coating the lesion with a jelly-like, protective mass, and by its astringent effect.'

'The technique of administrating colloidal aluminum hydroxide by the drip method.

'The technique of administrating colloidal alumnum hydroxide by the drip method . . requires hospitalization of the patient. The colloidal aluminum hydroxide, tion of the patient. The colloidal aluminum hydroxide, diluted to 25 per cent, is continuously instilled into the stomach through a nasogastric tube at the rate of 15 drops per minute, both day and night, for 10 days. The flow of the drops is regulated and controlled by a special apparatus.

The flow of the drops is regulated and conspecial apparatus.

'The indwelling nasal catheter was the source of considerable difficulty in some of the early cases, a no. 12 Levine tube was used, the lumen was so small that it would become occluded by particles of small that it would become occluded by particles of the walls by the aluminum hydroxide itself. of the walls by the aluminum hydroxide itself of course, caused cessation of the flow, and necessitated of course irrigations of the tube, which corrected the

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difficulty only temporarily, and therefore had to be repeated frequently. When a large Levine tube was used, many of the patients complained of soreness in the nose and throat, even when the tube was well lubricated with mineral oil, and frequently they would remove the tube themselves when the discomfort became too great.

became too great.

'These difficulties were overcome by using a soft collapsible thin rubber tube about \(\frac{1}{2}\) inch in diameter, passed through the nose into the stomach with the aid of a silkworm-gut suture. This acts as an obturator and is left in place within the tube to prevent its kinking. This tube has entirely eliminated the difficulties of obstruction of the lumen and discomfort to the patient experienced with the Levine tube. The nasogastric tube is passed only as far as the lower end of the esophagus. This precaution eliminates the rare possibility of any danger of trauma to the lesion.'

'In the few instances in which patients objected to

or could not tolerate the nasogastric tube, the medication was administered by mouth. One ounce of a 25 per cent suspension of colloidal aluminum hydroxide in water is given every hour during the day until the patient retires, and then he is awakened every two hours during the night to receive the same dose. Usually a sedative is administered in the evening, so that the patient falls asleep promptly after being aroused for the medication. With the drip method, of course, the patient rests all night without interruption.'

'Along with this treatment in the hospital, the patient receives a bland diet of which small quantities are taken every two hours for 12 hours. This consists of milk with one-third cream, cooked cereal (oatmeal, farina and cream of wheat), a soft boiled egg, a slice of toast, butter, cream soups, gelatin, custard, tapioca, and junket. Inasmuch as the astringent action of aluminum hydroxide causes some constipation, mineral oil is given daily, or enemas every other day. A sedative is administered each night to prevent worry about the treatment.'

'The same regimen is employed in cases of hæmatemesis and melæna. As soon as the patient with melæna is admitted to the hospital, a soft nasogastric tube is passed through the nose to the cardiac end of the stomach, and the drip treatment is begun. If hæmatemesis is present, the patient receives colloidal aluminum hydroxide by mouth every hour until vomiting has ceased: then the drip treatment is begun.

ing has ceased; then the drip treatment is begun.

These patients receive food every two hours, and the diet is the same as that administered to other patients with peptic ulcer. To induce rest, the hypodermic administration of sodium phenobarbital is preferred to that of morphine, because morphine not only interferes with the normal function of the gastrointestinal tract, but also has the undesirable effect of causing emesis, in some instances.

'Small transfusions, usually about 250 c.c. of blood, are given when the systolic blood pressure is reduced to less than 90, or when the hæmoglobin is below 30 per cent.'

'When the course of treatment in the hospital is completed, an ambulatory regimen is continued for 30 days after the patient leaves the hospital, before the healing of the ulcer is considered complete. When the ulcer crater has become filled in with granulation tissue, which is shown on the roentgenogram by disappearance of the niche, the lesion may still not be healed. It may take more time for the mucosa to grow around the periphery toward the centre. Hence this area must be protected against the harmful action of hydrochloric acid, until complete healing, with epithelization, has taken place. Even if the lesion were healed, the regenerated mucous membrane is thin and deformed, and implanted on dense fibrous tissue, with imperfect blood supply, and therefore would require

the same protection.

'The patients are advised to take two teaspoonfuls of aluminum hydroxide in two ounces of water every two hours until bed-time, and mineral oil at night, along with a convalescent ulcer diet. This diet is limited in quantity, and avoids mechanical, chemical and thermal

irritation. In addition to the foods allowed in the hospital, it includes puréed vegetables, stewed fruits, stewed chicken, creamed fresh fish, cottage or cream cheese, rice and macaroni.

'Even when the ulcer is completely healed, the underlying diathesis which produce it in the first place still remains, and consequently it is likely to recur. A patient with peptic ulcer should be taught to understand, and to accept the fact that, since the disease is caused by some fundamental physiologic disturbance as yet not well understood, the physician cannot promise permanent cure of the disability. The best that can be offered is to heal the existing ulcer, and to try to prevent recurrence by diet and medication'

revent recurrence by diet and medication.'
In a period of three years from September 1935 to October 1938, 407 patients with peptic ulcer were treated with colloidal aluminum hydroxide on the medical service at St. Luke's Hospital. In this group there was 322 men and 85 women. There were only eight negroes in the group; 399 were white persons.

Approximately 25 per cent of these patients (101) were suffering from acute massive hæmorrhage at the time of admission. In eight patients with hæmatemesis, the situation of the ulcer could not be determined. There were 285 cases of duodenal ulcer and 83 of gastric ulcer. Twenty-two patients had ulcers in both the stomach and duodenum, and nine had marginal ulcers (six of these followed gastro-enterostomy, and three followed gastric resection)

three followed gastric resection).

'The continuous drip method was used for 270 patients, while 86, who were unable to tolerate the nasogastric tube, received the medication orally. Fifty-one patients received colloidal aluminum hydroxide by both the continuous drip method, and orally. In these instances the nasogastric tube could not be tolerated for the entire period of treatment, and the remainder of the course was given by mouth.'

'The most striking features of this treatment are:
(1) the prompt relief of pain in all cases (within 24 hours); (2) the rapid healing of the ulcer (in seven to ten days, according to roentgenograms); (3) the healing of refractory ulcers in patients who had tried other methods of treatment, without success; and (4) the excellent results in cases of bleeding ulcer. Of 101 patients with massive hæmorrhage treated, only three died.

'It is not claimed that this regimen can prevent the recurrence of ulcers, after they have been healed. Nevertheless, 30 patients who have continued to take colloidal aluminum hydroxide by mouth for two years or more, have been followed closely throughout the entire period, and none of them has had a recurrence, although a number of them previously had had an exacerbation of ulcer symptoms two or three times annually, for several years. Laboratory studies made on these patients showed that the drug had no harmful effect, even when administered for prolonged periods.'

# Pentothal Sodium

By H. S. RUTH, M.D. R. M. TOVELL, M.D. A. D. MILLIGAN, M.D.

and

D. K. CHARLEROY, M.D.

(Abstracted from the Journal of the American Medical Association, Vol. CXIII, 18th November, 1939, p. 1864)

The intravenous use of pentothal sodium in anæsthesia has shown a definite and consistent increase since it was first offered in 1934. A five-year interval is too short a period after which to assume a final attitude on any anæsthetic drug or technique. Nevertheless it is a sufficient interval to indicate logically a way station in its history at which to pause for a critical survey. Therefore it is our aim here to 'examine the record' of that which has taken place to date. This examination will include a brief consideration of the literature, certain observations concerning the technique of its

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administration, and the scope of its rational application

An editorial of a leading surgical magazine in March 1939 aptly stated the present position of intravenous anæsthesia: 'The increasing usefulness of intravenous anæsthesia for many types of operations has never been as apparent as it has been recently.' This statement may be confirmed further by a perusal of the literature on the subject. More than 100 articles dealing primarily with or touching on the use of pentothal sodium have been published. Medical opinion is found

to be predominantly favourable.

In animal experimentation, it has been found that pentothal sodium may produce disturbances of cardiac rhythm. Conflicting evidence to this statement has also been observed, a brief of which may be presented as follows: A large percentage of animals showed no change in the electrocardiogram, while another group showed disturbances in rhythm and conduction which were temporary. The effect on the heart of human beings was insignificant. Electrocardiographic tracings were essentially negative. There were no changes or abnormalities in QRS or T-waves. No changes in rhythm were recorded when the drug was administered without the occurrence of cyanosis. There was no marked deleterious effect on the myocardium or conductive system of the heart demonstrable by the electrocardiographic record.

Focal necroses have been shown to have occurred in the liver in mice. It is generally conceded that the drug should not be employed in the face of overwhelming hepatic destruction. Only one instance of hepatic disturbance in man was found to be recorded. In that report it was suggested that there was a possibility that the toxic jaundice which developed after the administration of pentothal sodium to this apparently normal individual might have been a coincidental 'catarrhal jaundice'.

Attention has been called to the occurrence of temporary closure of the glottis and a hyperactive state of the laryngeal reflex, further complicated by frequent coughing. In addition, hiccups or sneezing may occur. It has been suggested that these phenomena are due to parasympathetic overactivity. For this the prenaesthetic administration of atropine or scopolamine is shown as an adequate prophylactic measure. One investigation on animals suggests the possibility of cumulative action. In this study a dosage identical with the original was injected whenever the signs of light anæsthesia presented. This method of procedure would suggest the possibility of overdose; no anæsthetist would administer in clinical practice the amount of any anæsthetic agent that was required for the purpose of induction, when, during the period of maintenance, the patient appeared in light anæsthesia. There is reported no change in the urinary secretion or in the concentration of blood urea. The blood sugar is reported as being raised somewhat, but not sufficiently to cause any practical difficulty in the control of diabetes. The drug causes an immediate depression of intestinal contraction and tonus. This primary effect was transient and succeeded by a more prolonged phase showing increased intestinal contraction and tonus, which persisted throughout the remainder of the anæsthetic period.

The use of pentothal sodium for diagnostic tests and for the control of convulsions due to the employment of toxic drugs and to tetanus and eclampsia appears to be of definite value.

A summation of the number of instances of the administration of pentothal sodium to human beings recorded in the literature is difficult of determination. It would seem that its use has been somewhat retarded, initially, by employment of the method of predetermined and nonfractional dosage formerly recommended for the administration of a comparable drug (evipal soluble). This method of dosage placed definite limitations on the use of either drug until such time as the intermittent method of administration was accepted generally. A further difficulty in estimating the number of administrations was presented by the fact that many reports on intravenous pentothal sodium

included, in the statistical portions, an unstated number of patients anæsthetized by evipal soluble. Nevertheless, 21,344 instances, in which pentothal sodium was administered intravenously to human beings, are reported.

#### ADMINISTRATION

The preparation of the patient, the chemical and pharmacological effects and the preparation and method of administration of pentothal sodium have been heretofore adequately described. These aspects will not be repeated at this time. Certain factors concerning its administration will be emphasized, however, and additional observations presented at this time.

be repeated at this time. Certain factors concerning its administration will be emphasized, however, and additional observations presented at this time. Prior to the publication of the pharmacological and physiological explanation of the value of the administration of atropine or scopolamine before pentothal sodium had been given, it was our practice to administer these drugs preoperatively. They not only effectively counteract the parasympathetic overactivity of this drug but minimize the likelihood of production of excessive secretions. Morphine is prescribed in many instances together with the atropine or scopolamine but always in decreased dosages as compared to those prescribed before inhalation anæsthesia. (We regard morphine sulphate one-eighth to one-sixth grain [0.0081 to 0.0108 gm.] as the maximal dose.) In the aged and debilitated, even though morphine is not administered, and in every instance in which their use is possible, either atropine or scopolamine is administered.

Caution regarding the speed of injection cannot be overemphasized. The patient to whom pentothal sodium is being administered has no active mechanism of defence as, for example, is initiated by the irritating action of ether. The facility with which patients may be anæsthetized has proved an ever present temptation to make the induction even more startling by the too rapid administration of the drug. A sacrifice of time will increase the factor of safety. It has been our practice recently either to consume from one to two minutes or more for the induction of anæsthesia rather than from twenty to thirty seconds, or at least to pause after the injection of 2 c.c. of a 5 per cent solution to estimate the depth of anæsthesia produced. Recently a 2.5 per cent solution, instead of the usual 5 per cent solution, has been employed with satisfactory results. This solution further facilitates a slow injection and appears to remove the possibility of the rare occurrence

of phlebitis. It should be emphasized that respiratory depression occurs readily following too rapid administration. No difficulty should be encountered if the administration of the is continued to the point of anæsthetic saturation of the tissues of the central nervous system at a rate sufficiently slow to avoid depressive concentrations being carried to the respiratory centre. Experience in its administration is the predominant factor in the problem of timing the rate of injection. It appears that it is a mean between a repid injection, which cyclely depresses mean between a rapid injection. It appears that it is the respiratory centre, and an injection which is sufficiently retarded so that time is allowed for the drug's detoxification, before a retailed. detoxification before anæsthetic concentrations produced. The function of respiration must be further protected by diligent maintenance of a patent respiratory tract. Relaxation of the soft tissues about the upper respiratory tract is apt to occur and thereby impinge on its patency. impinge on its patency. At the same time, obtundation of both pharyngeal and laryngeal reflexes does not occur until quite professional occur until quite profound anæsthesia has become established. Therefore, when an adequate cannot be maintained by proper position of the head, insertion of a pasophary real converged than a insertion of a nasopharyngeal airway rather than a pharyngeal airway should immediately be carried out. At times, if there is a substitute of the efficiency. At times, if there is an interference with the efficiency of the respiratory to the of the respiratory tract, recourse should be had to the usual methods for its rectification which are employed during inhalation are extracted. during inhalation anæsthesia, which include endotracheal intubation. Cyanosis should never be tolerated by anæsthetist. A source of the control of the contr anæsthetist. A source of oxygen under low pressure sufficient to inflate the lungs should be constantly available during the administration of pentothal sodium. al

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#### CONTRA-INDICATIONS

The contra-indications noted elsewhere are recognized by us. The drug is not employed when there is a marked physiological or mechanical interference with respiratory function. At the present time the drug is employed rarely for patients under 15 years of age and seldom below 10 years of age. The presence of cardiac dysfunction to the point of dyspnœa is recognized as a contra-indication. Varicosity central to the point of injection serves as a contra-indication or a possibility of slow entrance of the drug into the general circulation after injection is duly noted. Manipulations disturbing pharyngeal and laryngeal reflexes preclude the advisability of employment of this drug, unless other indications for it are real and adequate. In such a condition, preliminary topical anæsthesia of the affected mucous membrane is to be established. A definite deviation from normal in the oxygen-carrying capacity of the blood indicates caution in its application, as for example in the presence of severe anæmias. It would not seem wise to employ it in the face of gross hepatic damage, although we found in one instance that the icterus index and bromsulphalein test were unaffected by a forty-minute administration for an intra-abdominal visualization in the presence of massive cancer of the

UNDESTRABLE EFFECTS AND THEIR MANAGEMENT

Sloughing of tissue and irritation at the site of injection may be prevented by the injection of a 2.5 per cent instead of a 5.0 per cent solution. Respiratory depression is rarely a problem with careful and experienced administration but, when present, is best managed by inhalation or inflation of oxygen. Muscular tremors may be annoying, but slow administration usually overcomes them. If not, resort should be made to another agent. Postanæsthetic headaches are rare. The fall in blood pressure is minimal. Postanæsthetic nausea and vomiting are also rare.

### APPLICATION

We feel that pentothal sodium is a valuable drug for operations of short or moderate duration, when extensive muscular relaxation, particularly abdominal, is not required and when there is no interference with respiratory function and laryngeal or pharyngeal reflexes.

In addition, we would call attention to its value in our hands in certain supplementary capacities. The first of these is indicated during the operative period under regional or spinal anæsthesia, when such is prolonged. Here occasionally the patient may become somewhat uncomfortable as the result of the operative position. This condition is further complicated by a progressive diminution in the effects of the preanæsthetic sedation. Here we have found it quite advantageous to administer intermittently minimal amounts, just short of the establishment of unconsciousness. By this means the patient is rendered relaxed and calm and there is a re-establishment of the effects of the original presentations coult in the control of the original presentations.

of the original preanæsthetic sedation.

Anæsthetists are rarely called on to-day to anæsthetize patients suffering from toxic hyperthyroidism who have not been controlled medically before operation. Nevertheless, instances occasionally occur in which preoperative treatment in this condition is of decreased value and it becomes essential to anæsthetize these patients with a minimum of preanæsthetic disturbance. In such a situation it has been our custom to visit the patient in his room and to state that a blood test is to be performed. After venous puncture, the unsuspecting patient is put to sleep with just sufficient Anæsthesia is then continued by inhalation methods. By such means we have been able to remove the patient to the operating room and have the operation manifestations of the patient's disease. Pentobarbital purpose. From 3 to 4½ grains (0.2 to 0.3 gm.) administered intravenously will usually suffice.

The results in thirty-four major intracranial procedures were gratifying. Its application in this respect was initiated by a report that intracranial pressure is not raised by its use and by the freedom from hazard of fire and explosion that it provided. Infiltration anæsthesia is performed, and pentothal sodium is administered only when the patient becomes tired or restless. Initially, it is injected in similar fashion as described for prolonged operations under regional anæsthesia. In several instances it was not necessary at any time to produce complete unconsciousness. This method appeals to us because of its greater controllability as compared to rectal instillations of other agents. The continuous intravenous drip flows between administrations of pentothal sodium at any desired speed and prevents clotting in the needle. The operating time varied up to five hours and fifteen minutes, with an average time of two hours and forty minutes. The largest single dose was 3.15 gm., with an average dose of 0.95 gm. From both surgical and anæsthetic points of view we see reason to continue its use in such manner for major intracranial surgery but should state that this portion of the series is too small to be conclusive. It should also be emphasized that its application in this respect was managed only by a highly organized group.

#### SUMMARY

The contra-indications to the administration of pentothal sodium are specific. Patients should be carefully selected. Special care should be taken to maintain an efficient airway and one should always be prepared to administer oxygen by inhalation or by insufflation if necessary. The maximal dose of 1 gm. need seldom be exceeded. This potent drug should be administered by an anæsthetist competent to control all situations that are likely to occur during the administration of any general anæsthetic agent. The drug has produced satisfactory results in our hands. No post-operative pulmonary complications were encountered and no operative fatalities occurred. In view of its apparent effectiveness and safety, its growing popularity is warranted and further exploration for possible application among the groups of patients now receiving inflammable anæsthetic agents by inhalation seems justified.

### Oral Bismuth Therapy in Syphilis

(From the Journal of the American Medical Association, Vol. CXIII, 16th December, 1939, p. 2240)

The use of alternating courses of arsenicals, administered intravenously, with intramuscular injections of bismuth compounds in the treatment of syphilis is a standard procedure with many syphilologists. With this therapy the disease is under constant attack by the respective metallic compounds. Physicians who use the injection technique may be assured that the patient has received the prescribed dose. The routine weekly schedule facilitates the observation of the effect of the medication on the disease and on the patient. Regularity of examination and treatment is important to both the patient and the physician. It affords frequent opportunity for mental and moral influence, and encouragement by the physician. It aids in the maintenance of adequate records, which are useful in statistical evaluation of various therapeutic regimens. Perhaps most important to the individual and to society, routine administration of medication provides the physician with an effective means of insuring the prolonged co-operation of the patient—an essential requirement for the successful termination or control of the disease. Any plan of treatment which lacks these advantages requires serious consideration from a public health and socio-economic point of view before it is accepted as a suitable method for the treatment of syphilis.

Now, for the first time, appears a metallic preparation which seems to be useful when administered orally for the treatment of syphilis. The fact that it is taken

orally indicates that it may frequently be adapted for self-administration. This form of therapy is certainly not advisable except for intelligent, co-operative patients. Forgotten doses of medication or negligent behaviour on the part of the patient must inevitably lead to release with consequent pages with consequent. lead to relapse with consequent possibilities of infection of other people. It is essential that the patient take the medication regularly, as directed by the physician, or that the physician insist on the intramuscular route

for therapy for unco-operative patients.

There are, of course, certain instances in which the oral route of medication would be a valuable adjunct in syphilis therapy. It can be used with caution for those individuals whose business or profession necessitates occasional absences from the physician's supervision. It should prove useful for those rare persons who have unusual difficulty in taking intramuscular injections because of resultant pain and induration of the muscles. It is also possible that in selected cases of congenital syphilis and in some cases of cardiovascular and latent syphilis the oral route of medication would be distinctly

In the course of experiments directed toward the utilization of sodium bismuthate in antisyphilitic therapy, Hanzlik, at Stanford University, evolved preparations resulting from the interaction of sodium bismuthate, tri-isopropanolamine and propylene glycol, known as sobisminol mass and sobisminol solution. These products have been before the Council on Pharmacy and Chemistry for approximately three years, a period which was necessary for the accumulation and proper evaluation of evidence for the efficacy of the orally administered product. The studies of Hanzlik and his co-workers, of Sollmann, Cole and Henderson, and of others have shown, by clinical observations of antisyphilitic effects of sobisminol mass when given in sufficient dosage, that there is satisfactory absorption of bismuth following sobisminol mass by the oral route.

Attention is directed to a rapid clinical method for quantitative determination of bismuth, devised by Hanzlik and his co-workers, which has been used effectively to maintain accurate observations of the level of bismuth excreted in the urine of patients with bismuth preparations. Adequate references to these studies appear in the report of the Council on Sobisminol. While some gastro-intestinal disturbances have been encountered, generally they have not been sufficiently serious to interfere with adequate treatment.

This oral remedy cannot be expected to replace completely the carefully supervised use of other established therapeutic agents. It is to be emphasized that, while an oral bismuth preparation may in some situations be substituted in whole or in part for a bismuth preparation administered intranscularly, it could never serve as an adequate substitute for alternate courses of arconicals and bismuth accuracy.

of arsenicals and bismuth compounds.

Sobisminol mass must not be sold over the counter to the public as a cure for syphilis. If it were thus marketed, the product would be a real danger and detriment to the public health. Both Hanzlik and the manufacturers are most anxious that no such contingency shall arise. Therefore, according to agreements between the board of trustees of Stanford University and each of the three firms already licensed to manufacture the product, every legal effort is being made to prevent the sale of capsules of sobisminol mass to the public other than on or by the prescription of the physician. Self-medication in acute syphilis can only lead to relapse and resultant danger to the public

The ultimate evaluation of the therapeutic efficacy of a new drug such as sobisminol mass necessarily requires a long time. The close co-operation of Hanzlik and other investigators, the manufacturers, the Food and Drug Administration and the Council on Pharmacy and Chemistry in careful studies designed to evaluate and control this new product properly is highly commendable.

To summarize: A new antisyphilitic agent with the special property of effective oral administration will soon be taking its place in the alleviation of the

ravages of syphilis. Physicians, pharmacists and public health authorities must take care that sobismino health authorities must take care that sobisminol mass is not supplied directly to the public. Such distribution would obviously result in inadequate treatment of unrecorded and uncontrolled cases and thus would become a serious menace both to the individual and to the public health. Lastly it is pointed out that oral to the public health. administration of bismuth compounds is not intended to replace the generally accepted use of bismuth preparations intramuscularly, except where special conditions prevail.

# Collapse Therapy for Pulmonary Tuberculosis as a Public Health Measure

(From the Journal of the American Medical Association, Vol. CXIII, 16th December, 1939, p. 2241)

SINCE the late Theodore B. Sachs called attention to the menace of the wide spread of tuberculosis in Chicago, the isolation of patients with the disease in the open, or contagious, stage has come to be considered the important feature in the campaign against this disease. Isolation of patients with tuberculosis in a contagious form from children under 16 years of age was made mandatory in 1917. Despite the energetic and even rigorous enforcement of the law, the number of uncontrolled cases of tuberculosis in the community was not decreased. Hruby stated that in 1931 there were 700 patients on the waiting list of the Municipal Tuberculosis Sanitarium and as many on the waiting lists of the Cook County Hospital and Oak Forest institution. There were 20,000 registered cases in Chicago but only 2,471 available beds. While the idea of isolating patients with open tuberculosis was correct, it failed in its practical application for the simple reason that there was no place for the isolated persons to go.
In 1931 the board of the Municipal Tuberculosis

Sanitarium initiated a programme of collapse therapy on a mass scale in an attempt to stem the sources of infection. Every suitable patient at the institution and in the field was to receive the benefits of collapse therapy. The results of the campaign have now been analysed. Of 7,344 patients treated during the period between 1931 and 1936, 3,090 were treated by the induction and maintenance of pneumothorax for more than three months, while 3,584 patients were treated without collapse therapy. Of the 3,090 patients treated, 94.2 per cent had advanced tuberculosis, 84.4 per cent had positive sputum and 81.3 per cent had cavities. Of the total, 14.2 per cent were Negroes. In the collapse group 53.9 per cent were converted from positive sputum to negative, while in the control group the conversion amounted to 15.3 per cent. Thus, since the inception of the programme according to Hruby, the inception of the programme, according to Hruby, 1.285 'fountains of infection' have been shut off. After with 31.3 per cent in the control group. Of 1,215 patients with patients with positive sputum converted to negative, 227 had been negative from two to three years, 154 for from three to four wears. from three to four years, 94 for from four to five years, 27 for from four to five years, and 27 for from five to six years, and 25 for six years and over. While the mortality rates for the Municipal Tuberculosis Section 1997. Tuberculosis Sanitarium based on a study of 8,779 cases amounted to 20.00 amounted to 82.96 per cent for a five-year period and 91.6 per cent for the ten-year period, the group in which collapse therapy was practised showed a survival rate of 69.3 per cent at the end of five years.

Extensive collapse therapy instifed itself from the

Extensive collapse therapy justified itself from the point of view of protecting the community, because it converted a relatively large the community, eases, for converted a relatively large number of open cases, for which hospitalization facilities did not exist, from positive to a negative sputum. To overstress importance of the widest possible collapse programme and at the same time to understress or to leave facilities for the immediate hospitalization of the tuber culous models. facilities for the immediate hospitalization of the tuber-culous would be wrong culous would be wrong. A more correct orientation toward the pneumothorax therapy would be than as a problem of the individual rather public health measure. Indirectly of course

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would benefit as well. In every urban community there are many persons with unrecognized open tuberculosis, Cases are diagnosed as a rule in the advanced stage of the disease, that is, after countless numbers of others have been exposed to infection. Not all the cases are suitable for collapse therapy and the latter is effective in only a certain proportion. Pneumothorax therapy cannot therefore be regarded as more than a therapy cannot interest significant aid in the wider problem of the eradication significant aid in the wider problem of the eradication is largely tuberculosis. The control of this condition is largely a matter of early diagnosis and segregation. No doubt the programme would have yielded still better results in Chicago if better facilities for applying the principle of segregation had been available.

# Clinical Studies in Non-Dysenteric Intestinal Amœbiasis

By J. J. SAPERO

(Abstracted from the American Journal of Tropical Medicine, Vol. XIX, November 1939, p. 497)

DIVERSE opinions are held regarding the pathogenic rôle of Entamæba histolytica in cases of intestinal amæbiasis which present neither a present nor past history of dysentery. Certain clinicians tend to attach clinical significance only to the dysenteric manifestations of the organism; others attribute to E. histolytica a wide range of protean symptomatology. Although the view-points of the majority are at neither of these two extremes, there is a considerable lack of agreement as regards both the nature and the frequency of symptoms in amœbic infections and their clinical importance

when dysentery is absent.

Dobell in his monograph states that probably less than 10 per cent of persons who become infected with E. histolytica ever suffer to any appreciable extent from their parasitism. Faust believes that 90 to 95 per cent of persons harbouring the organism are apparently symptomless carriers. More recently, Wenrich, Stabler, and Arneth noted little evidence of pathogenicity in carriers found in an examination of college students, and observed that a control group seemed to have as many or more signs of ill health than those in their series who were carriers of E. histolytica.

Findings contrary to these have been reported by other workers. Craig, who has had wide experience in clinical amœbiasis, states that in his experience about 65 per cent of carriers have had symptoms referable to their infection, and that these symptoms disappeared after the eradication of the parasite. Philiptschenko reports that one-half of 400 apparently healthy carriers found in the control of the parasite. found in a survey of Leningrad food handlers had various intestinal disorders. Johnstone and his coworkers found that 52 out of 92 infections among a prison prison group were associated with notable gastro-

In addition to the discrepancies in the frequency with which symptomatology is associated with E. histolytica infections, it is to be noted that agreement is also lacking an infection of the infect lacking regarding the nature of the symptoms. Certain observers have incriminated the organism as the causation. causative agent of symptoms far remote from the gastrointestinal tract. Boyers, in an analysis of 1,961 complaints presented by persons found to be infected, believes his believes his results show symptomatology referable to many other systems of the body. Craig, although mainly other systems of the body. mainly emphasizing the gastro-intestinal manifestations, notes that notes that frequently nervous and circulatory disorders are attributed to the histoletical Arthritis, iritis, are attributed to E. histolytica. Arthritis, iritis, Hodgkin's disease and other conditions have been suspected of being caused by the organism, but no convincing actiological relationship has been demonstrated in such cases and those claims have not at present in such cases and those claims have not at present gained any acceptance.

Many features lend particular importance to the problem of non-dysenteric amedic infections. Primarily be considered in the constant that E histolytica is an to be considered is the concept that *E. histolytica* is an obligate tissue parasite and that in every individual harbouring the organism there is a process of invasion

and repair accompanied by more or less injury, the amount of disease, in all probability, being dependent on host resistance. As reliable estimates place the incidence of the organism to be about 10 per cent in the United States, it becomes important to reach some. agreement on what proportion of the cases of amœbiasis show evidence of injury.

Physical signs.—One of the most striking findings was the presence of abdominal tenderness. No less than 29 out of 46 gave this sign. The most prominent localization was at McBurney's point. In several instances this sign was so marked that had the individual complained concurrently of the symptoms encountered in appendicitis, operation would have appeared advisable. Circulatory abnormalities were not observed.

Nature of symptoms.—An analysis was made of 47 cases in which there was no ætiological factor other than the parasitic infection which would adequately explain the syndrome. To these were added seven cases in the control group who, although admitted for treatment for some unrelated condition, were found to be suffering concurrently with symptoms referable to their E. histolytica infections.

#### TABLE

Subjective complaints and objective signs in 54 hospital cases harbouring E. histolytica in which no other ætiological factor would adequately explain the

Past history—	
Dysentery	0
Appendicitis	24
Present history—	
Nausea	20
Vomiting	6
Distension or flatulence	18
Heart-burn	12
Abdominal pain	50
Epigastric	13
Umbilical	9
Right lower quadrant	14
Left lower quadrant	5
Generalized	9
Bowel movements, normal	28
Bowel movements, abnormal	26
Diarrhœa	9
Constipation	12
Diarrhœa and constipation	5
Undele	16
Fatigability	14
Nervousness	
Loss of weight	10
Physical signs—	
	277
Tenderness, abdominal	37
	7
	18
Ascending colon	7
Transverse colon	8
Descending colon or sigmoid	10

Almost one-half had at some recent time come under observation for appendicitis. Occasionally, upper gastrointestinal complaints occurred to the exclusion of all other complaints. Pain was the most frequent other complaints. Pain was the most frequent symptom. The bowel movements were normal in over one-half of the cases. Constipation was a more frequent complaint than diarrhoea, this latter symptom occurring in but a small proportion of the cases. Nervous and circulatory disorders occurred but almost always in association with and subordinate to the gastro-intestinal complaints. Tenderness in various regions of the colon was elicited in 37 of the 54 cases and again the sign was commonly localized over the cœcum.

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#### TABLE

Tentative admission diagnoses on 47 cases in which later clinical study revealed no adequate cause to explain the syndrome other than the presence of \*\*Entamæba histolytica.\*\*

		N	umber	(
			cases	
Appendicitis, subacute o	or chronic		18 10	
Peptic ulcer or chronic			7	
Enteritis, chronic Gall-bladder disease			4	
Gastro-enteritis, acute			3	
Appendicitis, acute			3	
Renal colic			2	
	TOTAL		47	

The tentative admission diagnoses made in 47 cases demonstrate the wide variation of conditions simulated by amebic infections. The large number of cases thought to be appendicitis is consistent with other observations recorded in this series. Of those cases which came to operation, only those were included in which the pathological report of the appendix revealed no evidence of cases. It is to be noted that the larger number of cases were considered subacute or chronic manifestations of appendicitis, most of which were discharged without operation.

The most frequent was pain, being presented by 34 out of 47 cases. In three of the cases the complaint was mainly of weakness and in one the chief symptom

noted by the patient was headache.

#### TABLE

Chief complaint in 47 cases harbouring Entamæba histolytica in which there was no adequate cause to explain the syndrome other than the presence of the

Pain			 34
Epigastric			 11
Umbilical			 5
Right lower	quadrant		 8
Generalized			 8
Lumbar	a 55.		 2
Nausea			 1
Constipation			 4
Diarrhœa			 3
Alternating cor	istipation an	d diarrhœa	 1
Headache	••		 1
Weakness			 3

Result of treatment.—Carbarsone in 0.25 gram capsules administered twice daily for a period of 10 days was given as a routine. The follow-up examinations were made between six and twelve months after treatment. Approximately three-fourths obtained

after treatment. Approximately three-fourths obtained relief following carbarsone administration. Although but few cases are included in which no treatment was given, it is of interest that the results were exactly opposite, the majority stating either that their symptoms had persisted or had become aggravated.

Comment.—Judging from the rarity with which diagnoses of non-dysenteric phases of amcebiasis are made in medical practice, and considering the prevalence, of E. histolytica, one would come to the conclusion that clinical manifestations of the organism without dysentery are rarely of such severity as to conclusion that clinical manifestations of the organism without dysentery are rarely of such severity as to require medical assistance. In the present investigation, however, quite the contrary proved to be so. Even in what may be presumed to be a highly resistant group, some of the infected individuals presented complaints which could not be regarded as unimportant. In the hospital study an impressive number of cases proved to be of amedic origin and had not the presence of the parasite been demonstrated, the final diagnoses in these cases would have fallen in that large and unsatisfactory group in which neither the true cause nor the nature of the disorder is known.

The most striking feature of the cases studied in the investigation was the dissimilarity of their clinical manifestations as compared to the symptomatology

dysentery. Whereas amœbic in encountered encountered in amount dyschiety, whereas the presence of dysentery, or blood and mucus in the stools presence of dysentery, or blood and flucus in the stools immediately brings to mind the possibility of an amæbic process, the same organism is capable of producing process, the same organism is capable of producing process. process, the same organism is capable of producing disorders which give but scant clues to the nature of the disease. This observation becomes of greater importance in view of the fact that the largest proportions are of this latter type. importance in view of the latter type, tion of amœbic infections are of this latter type. This importance in the importance of this latter type. This was demonstrated in a recent Naval survey in which only 4.6 cases of dysentery were found for each only 4.6 cases of dysentery were found for each histolytica. Thus only 4.6 cases of a state of the non-dysenteric despite the less serious nature of the non-dysenteric despite the less serious nature of the non-dysenteric despite the less serious americans as compared with those cases of intestinal americans as compared with those presenting dysentery, the difficulties in their diagnosis and their prevalence constitute a problem of some importance in clinical medicine.

It appears that a large number of apparently obscure gastro-intestinal cases which seek relief in hospitals and clinics are actually cases of amœbiasis and that frequently these cases are not being diagnosed. The lack of recognition of the non-dysenteric syndromes is due to the fact that a positive diagnosis is dependent on the demonstration of the organism in the stool examination. It is known that rarely should the organism be reported in any less than 5 per cent of routine stool examinations, yet too often hospital laboratory reports fail to reveal any such incidence of infection. Where this is so, the infections cannot be diagnosed and this situation has led to a false impression regarding the clinical importance of non-dysenteric

manifestations of E. histolytica.

Certain clinical aspects of these cases are characteristic enough to bring to mind the possibility of an amoebic infection and lead to an intensive search for the parasite by stool examination. From the clinician's the parasite by stool examination. From the clinicians standpoint, a clear understanding that blood and mucus need not be associated with amœbic infections is of fundamental importance. Usually the non-dysenteric case is first suspected of being some well-defined and common gastro-intestinal entity, but a study shows so much to be atypical that the anticipated diagnosis cannot be reached. It is this very atypicalness which should suggest amorbiasis and with abdominal pain as a should suggest amœbiasis, and with abdominal pain as a prominent complaint, and when the symptoms are characterized by chronicity and recurrency, these features all become especially suggestive of amediasis.

Of special interest in the present investigation was the common occurrence of a syndrome simulating sub-acute or chronic appendicitis. Appendicitis was partic-ularly apt to come under consideration in the disorders ularly apt to come under consideration in the disorders encountered in these groups, but the frequency with which the various attending physicians were led to consider the possibility of disease of the appendix was a striking feature of the investigation and one which indicated the organism to have an important rôle in such syndromes. The possibility of a large proportion of the non-dysenteric cases suffering from an amedic typhlitis suggests itself. Many of the cases harbouring the organism were subjected to operation. In none of the infections were ill effects noted as a result operation, and in a few, serious results undoubtedly operation, and in a few, serious results undoubtedly would have followed had operation been withheld. The significant fact was that in the signs were significant fact was that in many cases the signs too mild to indicate surgery, while in others was a return of like symptoms after operation, these facts suggesting the advisability of anti-amœbic therapy in connection with other indicated treatment in these cases.

Summary.—In the present clinical investigation only uses of intestinal cases of intestinal amediasis in which there was neither a present nor a past history of dysentery were studied. The cases comprised both symptomless carriers of E. histolytica and infected individuals with complaints of varying severity. Control observations were made of varying severity. Control observations were made whenever feasible. Only those symptoms and signs were ascribed to E. histolytica. ascribed to *E. histolytica* after other possible causes had been ruled out. In all, 216 cases of non-dysenter have symptoms.

1. A study of the occurrence of symptomatology in a selected group of 106 apparently healthy men harbouring E. histolytica showed 46 or 43.4 per cent to

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symptoms. A control group of 108 cases negative for intestinal protozoa revealed but 8 or 7.4 per cent to have complaints. Of the 106 cases of amediasis only 13.2 per cent of the complaints were of any appreciable

severity.

2. Of 236 individuals harbouring various intestinal protozoal species, but not E. histolytica, the percentage with symptoms was similar to that found in the nonparasitized group, with the exception of Dientamæba fragilis in which 27.3 per cent of 44 cases presented symptoms. Similarly, some of the flagellates presented higher percentages than the controls. 'An explanation

of this apparent pathogenicity was offered.

3. A study of the blood findings in 61 cases of apparently healthy carriers of *E. histolytica* showed no significant differences from the results obtained in a control group of an equal number of individuals not

harbouring the parasite.

4. Despite the apparent trivial nature of the complaints presented by most of the cases in an ambulatory group, it was found by a study of various hospitalized groups that a considerable number of non-dysenteric amœbic infections are severe enough to require hospitalization. In 47 such cases the disease picture was so obscure that only the finding of the parasite in the stool led to the proper diagnosis, and in these, specific anti-amæbic treatment gave good results where other methods had failed.

5. A study of the nature of complaints revealed these to be primarily referable to the gastro-intestinal tract, yet without blood and mucus in the stools and usually without bowel abnormalities which might suggest an amobic process. Complaints referable to both upper and lower gastro-intestinal tracts appeared with equal frequency. Complaints referable to other systems were seldom encountered. Chronicity, recurrency and mildness of the symptoms were characteristic features.

features.

symptom-complex simulating subacute chronic appendicitis was the most commonly observed syndrome in this series of non-dysenteric cases of amæbiasis.

# Treatment of Gastric Ulcer

By DUNCAN LEYS, B.A., D.M., M.R.C.P. (Abstracted from the Medical Press and Circular, Vol. CCIII, 14th February, 1940, p. 132)

It is impossible in a short paper to attempt a complete review of so wide a subject, or to avoid being rather dogmatic. Some preliminary important essentials are not continuously accounted diagnosis must tials are not controversial. Accurate diagnosis must precede treatment, and this can only be made, after the ulcer is suspected, by full investigation (x-ray by an expert, repeated examination of stools, fractional test meals, possible gastroscopy, possible surgery). Most peptic ulcer cases have dyspepsia, but not all; presenting symptoms are long. presenting symptoms may be (a) anamia, from long continued slight blood loss; (b) sudden gross hamorrhage (which may be concealed); (c) perforation, with local or general peritonitis. Provided the diagnosis has been made as completely as possible, and is reviewed been made as completely as possible, and is reviewed as fully if treatment does not restore the patient to complete health, the general practitioner is as capable as anyone of carrying out that treatment if conditions at the patient's house are relatively good. He is certainly actions are relatively good. certainly never justified in treating a case without such investigation.

have I have previously emphasized the difference in prognosis, treatment and probably ætiology between gastric and duodenal ulcer: subsequent work has made this differentiation. this differentiation even more important. Duodenal ulcer is made in the control of subsequent carcinoma. ulcer is probably never the site of subsequent carcinoma. Finsterer, of Vienna, finds an incidence of at least 15 per control of the histology of chronic 15 per cent of carcinoma in the histology of chronic gastric ulcers resected. Duodenal ulcer occurs at an earlier ago and for average woman with a duodenal earlier age, and for every woman with a duodenal ulcer there are nine men, while the incidence of gastric tion is approximately equal in the two sexes. Perforation is nine times more common in men than in women tion is nine times more common in men than in women,

and is far more common in duodenal ulcer than in gastric. Duodenal ulcer has no special social incidence; its ætiology is unknown, but neurosis is very commonly associated with it. Gastric ulcer is predominantly a disease of poverty, is known to be associated with the gastritis which occur in serious infections (e.g., diphtheria) in childhood and adolescence, and there is

no obvious association with anxiety.

There is some evidence that the relative incidence of duodenal and gastric ulcer varies according to the country; in the U.S.A. duodenal ulcer appears to be more common than gastric; in England gastric ulcer is quite as common as duodenal. It is supposed that the proportion in Scotland is approximately the same as in the U.S.A., and this is borne out by my own experience in the Highlands for the last twelve months, during which I have seen 19 proved cases of duodenal ulcer, but only 11 cases of gastric ulcer and one case of proved ulcer carcinoma. Mr. A. J. C. Hamilton informs me that in approximately the same period his surgical experience at the Royal Northern Infirmary and in private practice included 23 cases of duodenal ulcer and seven gastric. Perforation tends to increase the proportion of duodenal to gastric cases seen in surgical practice, and the economic status of the patients undoubtedly affects the incidence in published series of cases.

These facts, which have a definite bearing on prognosis and treatment, are of little or no help in diagnosis: one is never justified in assuming on clinical evidence alone, no matter how 'typical' the symptomatology that a given patient, whatever his age, class, or sex, has one or the other. At the risk of becoming tedious I wish to repeat that it is thoroughly bad practice, involving the taking of quite unjustifiable risk, to treat any case with more than a history of a week or two as one of 'indigestion' or as gastric or duodenal ulcer without full investigation of the site and chronicity of the ulcer. Disappearance of symptoms under treatment is no sure guide to healing; cancer cases will often 'improve' under the same

conditions.

To put the position shortly: there is almost complete ignorance as to the cause of duodenal ulcer, and treatment is therefore extremely unsatisfactory, with a high relapse rate and high perforation rate; it only kills, however, through perforation, massive hæmorrhage, or pyloric stenosis from scarring. Ulcers on the proximal side of the pylorus may be found at any age, but are commoner in middle and old age; even with present knowledge it is probably a preventable disease (well balanced diet, avoidance of grave infections—especially in childhood). The risk to life from gastric ulcer is mainly from profuse bleeding (mortality low with good treatment, 30 per cent under the old starvation-rectal saline regime), and from the development of carcinoma on the site of a chronic ulcer. Treatment is extremely satisfactory, except when chronicity makes the risk of cancer great enough for surgery to be necessary. Finsterer, the king of gastrectomists, has a direct mortality in simple ulcer resections of 2 per cent: for most surgeons undertaking the operation it is at least 10 per cent. Finsterer's mortality for gastrectomy in cases thought to be simple ulcer, but subsequently shown by careful histology to have undergone malignant change is 4 per cent when other organs are not change, is 4 per cent when other organs are not involved, 33 per cent when they are; his five-year survival rate for all cases of ulcer-cancer is only 9 per cent.

It is essential to bear these points in mind when deciding on the line of treatment to be followed on a given case. I would add three other cautions:

- (a) If a patient with supposedly simple non-perforating ulcer of the stomach continues to get pain after resting a week in bed, the diagnosis is wrong.
- (b) Ninety-six per cent of simple ulcers are near the lesser curvature, the remaining 4 per cent in the prepyloric area. A greater curvature ulcer is malignant.
- (c) Free hydrochloric acid is frequently present after carcinoma has appeared.

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OUTLINE OF TREATMENT IN GASTRIC ULCER

(A) The patient is not cachectic, has not had any gross hamorrhage, and the ulcer has been shown by x-rays to be near the lesser curvature or prepyloric.

(i) Success will largely depend upon the length of time which the patient can spend in bed, and upon his subsequent ability to take a liberal diet of the right composition. Alkalis and antispasmodics play; no part in the treatment. They may relieve pain, but will never heal the ulcer; rest and good diet will do both. Gastric ulcer is seldom associated with hyperchlorhydria; a low acid curve is common, and achlorhydria not rare. Alkalosis during treatment with large doses of alkali is a real danger and occasionally fatal.

The longer the history, the longer the rest required. The patient with a few weeks' or months' history needs at least one month in bed and a further two months' freedom from any heavy work. Several years of history means several months of bed treatment, complete for some weeks, and thereafter for at least 18 hours out of the 24. Since there is no absolute criterion of complete healing (with the possible exception of gastroscopy—neither x-ray appearances nor the absence of blood in the stools is a guarantee), one must insist on treatment for some weeks after apparent healing has occurred as judged by the radiologist.

healing has occurred as judged by the radiologist.

Since chronic ulcer is more common among men than women, difficulty is sure to be encountered in persuading patients to undergo such a long period of unspectacular treatment unless the position is fully explained, the risks emphasized and full consent obtained at the outset; the difficulties are exactly those encountered in advising patients with pulmonary tuberculosis with regard to sanatorium treatment.

(ii) Rules for diet are positive rather than negative, i.e., it is not generally a question of ruling out certain foods, but of insisting on generous quantities of the right food. Some exclusion rules are sensible, alcohol certainly, known gastric 'irritants' (at least during the early stages of treatment) and bulky or 'indigestible' foods, such as new rolls and bread, stodgy suet or milk puddings. The essential foods are animal fats, first-class protein, the vitamins and iron—milk, butter, cheese, meat, fish, eggs, fruit juice, cod-liver oil, or a concentrate, and so long as the hæmoglobin level is less than 90 per cent, 90 grains daily of iron and ammonium citrate. If economic circumstances have been particularly bad, it is probably wise to 'saturate' the patient also with vitamins B<sub>1</sub> and C by giving the equivalent of 5,000 units of vitamin B<sub>1</sub> and 200 mg. of ascorbic acid daily for a fortnight.

(iii) As with most other illnesses, if the patient can have his bed out of doors so much the better; the benefit is probably psychological, but is definite

the benefit is probably psychological, but is definite. (iv) No purgatives should be used. A paraffin-magnesia emulsion, with occasional enema if necessary, should be used.

should be used.

(v) Tobacco need not be abandoned, but should not be abused.

(vi) Dental treatment.—This will depend rather on one's personal bias for or against the 'focal sepsis' theory. Wholesale extractions are certainly a mistake, whatever the state of the mouth, and especially in the early stages of treatment, when a debilitated patient may easily react by developing a septicæmia against which he has no immunity. For my own part, I regard dental caries and pyorrhea as one symptom of diet deficiency not necessarily curable by diet, since some of the damage is irreparable, but of little consequence per se. An edentulous patient should of course be provided with dentures if he is to take a reasonable diet.

The progress of the patient must be judged either by x-rays or gastroscopy, or both. It may be necessary, but it is always unwise to do without. If the ulcer is a chronic one and the patient symptomless, an x-ray can be taken after two months of treatment; it will cause the patient unnecessary disturbance to do it earlier, and is a waste of time for the radiologist. Recurrence of symptoms under treatment almost certainly means a wrong diagnosis. If the radiologist

cannot report substantial change towards healing after a few weeks in a relatively acute case, or two months in a chronic one, carcinoma should be suspected and considered. Benzidine reactions should be done for occult blood in the stools every week or ten days (a bedside test, no more difficult than testing after three weeks of treatment should raise serious doubt about the diagnosis, provided hæmorrhoids have been excluded (if these are present they should be promptly treated).

# (B) The patient has had an evident gross hæmorrhage (hæmatemesis or melæna).

It is very necessary that one should be cautious about the diagnosis, and prognosis must be guarded. There are many causes of severe hæmorrhage from the stomach—e.g., cirrhosis of the liver, whether alcoholic or part of a hepato-lienal fibrosis (Banti's disease), and carcinoma (uncommon as a cause of profuse hæmorrhage). I have recently seen a case of acute leukosis (leukæmia) in which hæmatemesis was the first symptom calling for medical attendance.

(i) A patient with hamatemesis of more than hall a pint should be at once transferred to hospital or nursing home, since his life may depend upon blood transfusion. There is no longer a controversy on this transfusion. There is no longer a controversy on this point: the theoretical danger of moving him by ambulance is infinitely less than the risk of repeated bleeding (or steadily continuing bleeding) carrying him, possibly within a few hours, beyond help. It is impossible to predict that a patient with a first hamorrhage will fall into the group of 'mild' cases with probably a 100 per cent recovery rate; the 'severe cases not treated by transfusion have a mortality rate of about 30 per cent. Authorities differ as to the exact indication for transfusion, some taking a hæmoglobin level of 50 per cent, others 40 per cent, or even 30 per cent as the critical point; the higher figure is probably the best since transfusion for hæmorrhage not accompanied by serious disease of blood or blood vessels has no dangers, and the recovery of the patient is always hastened. Drip transfusion (of several pints of blood if necessary) is increasingly used as being more effective, and as providing a controlled rate of replacing lost blood. A single transfusion of 20 oz. of blood-citrate mixture will not raise the hæmoglobin level more than 10 per cent, but may be all that is necessary to save life if hæmorrhage has actually ceased. Apart from estimations of blood volume the hæmoglobin level is the only criterion of this, and one has to remember that if it is estimated immediately after hymography as a few will be obtained immediately after hæmorrhage a figure will be obtained which has no relation to the total blood lost (i.e., is deceptively high) since several hours must elapse before tissue fluids have restored the blood volume and diluted the evisting hamographic. and diluted the existing hæmoglobin.

Transfusion without compatibility tests performed by someone experienced in their use is only justifiable in extreme emergency (i.e., in a moribund patient): a near blood relative is then the least dangerous donor.

(ii) The second big change in the treatment of hæmatemesis in recent years, and one now fully accepted as not only reducing mortality and hastening convalescence, but also as making treatment much more tolerable for the patient, is liberal feeding. It is odd that the traditional starvation treatment should have remained the standard for so long, yet it required great courage and determination on the part of Meulengracht who introduced this revolution three years ago, to begin his trials. His total mortality years ago, to begin his trials. His total mortality among 250 cases of hæmatemesis was less than 1 per cent; of a similar group treated in a neighbourned hospital in Copenhagen, on exactly the same lipes except for the diet, 8 per cent died, and this was also Meulengracht's death rate previously.

The simple theory behind his treatment is that a full stomach is less motile, has less unneutralized acid, and supplies to the patient foodstuffs and minerals which he urgently needs in blood regeneration.

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Practice has completely confirmed his theory in numerous clinics. Feeding abolishes rapidly the intense thirst and discomfort, and hastens by weeks the return to a normal hæmoglobin level.

The diet need follow no absolute rule. Meals may be taken at ordinary times, and the food be of the kind mentioned above (the preparation at first should be by steaming, meat should be minced or mashed be by steaming, meat should be inhered or mashed and vegetable sieved; helpings should be of moderate bulk). Feeding should begin immediately after the patient has stopped vomiting. Fluids can be given according to desire (broths, soups and alcohol alone excepted). Vitamin additions are advisable from the excepted). Vitamin additions are advisable from the first, and iron in full doses should always be given. No attempt should be made to relieve constipation for several days.

for several days.

(iii) Morphia, the old standby in treatment, is useful, particularly if the patient is frightened, but gr. 1/6 by injection, repeated two or three times during the first day or two is all that is necessary. Saline rectal infusions are rarely required if feeding is being employed (with transfusions if necessary)

Operation as an immediate treatment in hæmatemesis has been seriously practised, but has almost no support in Great Britain. So long as one patient in three with severe hæmorrhage died, there were good grounds for experimenting with surgery, although it was never possible to predict that the patient who had lost 20 or 30 ounces of blood would not recover spontaneously, and the possibility of ligating the bleeding vessel was always problematic. When transfusion and early feeding can reduce total mortality from hæmatemesis to one in a hundred, surgery remains the last remedy, i.e., the surgeon operates when bleeding continues unabated after some days, drip transfusions maintaining the blood volume before and during the operation.

The patient who has been treated on these lines and who has shown no signs of recurrent hæmorrhage after 10 to 14 days can be safely and advantageously transferred to his own home to continue convalescence, provided that the source of his hæmorrhage is subse-

quently to be fully investigated.

(C) The treatment of gastric ulcer cases not included under headings A and B is by operative surgery, the indications for which are:—

(a) Perforation (suture).

Long continued profuse hæmorrhage (ligature or resection)

(c) Chronic ulcer not improving after two or three months of 'medical' treatment (resection).

(d) Fear of carcinomatous change (resection).

(e) Pyloric stenosis or hour-glass contracture giving

rise to severe symptoms (short circuit or resection).

Perforations apart, the actual decision to employ surgery is not an easy one, and ought to be regarded with great gravity. In hospital practice there should be bedside discussion of the case between physician and surgeon (and radiologist if possible), but it is best that the surgeon's opinion should be sought early in the course of treatment, at the time when the possi-bility of operation becoming necessary first arises. There is no evidence that short circuit operations hasten recovery when obstruction is not present, and it is always worth while to postpone operation even for pyloric stenosis, until repeated x-ray examination makes it certain that gross delay in emptying cannot be remedied by a month of rest, good diet and gastric lavage; this delay, of course, is only justifiable provided the appearances do not suggest neoplasm.

The general practitioner's function in the

ment of gastric ulcer is that of preliminary diagnosis, investigation, encouragement during on tedious treatment, and the responsibility of seeing that every possible opportunity is taken for the best treatment. His function cannot be reckoned as either greater or less than that of the specialist's, and unless circumstances force him to do so, it is a profound mistake for him to attempt to combine the two in his

own person.

# Reviews

AN ATLAS OF THE COMMONER SKIN DISEASES.— By Henry C. G. Semon, M.A., D.M. (Oxon.), F.R.C.P. (Lond.). Second Edition. 1940. John Wright and Sons Limited, Bristol. Pp. xii plus 272, with 120 plates produced by direct colour photography from the living subject. Price, £2 2s.

This atlas contains 105 colour plates of what the author classes as common skin diseases and 15 of less common ones, a total of 120.

The plates are extraordinarily well produced and with very few exceptions the colours are true to nature. No attempt at classification is made, the plates being arranged in alphabetical order of the diseases they portray, and in the reviewer's opinion this is by far the better arrangement because skin diseases as a whole do not admit of division into clearly defined groups except

in a very restricted sense. The short descriptions of the plates and outlines of diagnosis and treatment are clear, concise and informative, and a pleasing feature is that in many instances there are referenced to the course and diagnosis (or there are references to the course and diagnosis (or wrong diagnosis at first) of the actual case from which a plate is taken so that one lays the book down with the feeling that he has been attending a skin clinic where specially selected cases have been skilfully demonstrated by an expert.

lf one may offer a mild criticism it is that plate XLVII of Bockhart's impetigo is a depiction of the advanced in the advanced by the second s the advanced and rather chronic condition into which it subsequently develops and would not be helpful in diagnosis of an early case. Unfortunately the book will not be of great use in India or other countries where the majority of persons have dark skins, because the appearances, particularly of the erythematous and pigmentary skin conditions, are very different from their appearance on white skins. A similar atlas of

dark-skinned people is badly needed.

The price £2 2s, is not high considering the excellence of the contents of the book, but it is a lot of money for a general practitioner to spend on a book that deals with only a small section of the cases he is likely to encounter in his daily round.

P. A. M.

ASTHMA AND THE GENERAL PRACTITIONER.-James Adam, M.A., M.D., F.R.F.P.S.G. Baillière, Tindall and Cox, London. 1939. Pp. ix plus 157.

THERE has been a growing tendency to consider all cases of bronchial asthma as allergic in origin, so much so that patients suffering the symptom-complex of asthma, but showing no signs of allergy, are often labelled as cases of asthmatoid bronchitis and not of asthma. This classification of cases into asthma and asthmatoid bronchitis is not very much appreciated by workers in countries like India where allergy does not seem to play a very important rôle in bringing about the syndrome. A simpler and more acceptable terminology would perhaps have been to use the term asthma for all the cases suffering from the syndrome and then to divide the cases into 'allergic' and 'non-allergic' according to whether or not 'allergy' was responsible. From this point of view the publication under review is a pleasant departure from the present-day 'allergy'-ridden literature on asthma. The author recognizes that asthma may or may not be of allergic

origin, and states that 'asthmatics are about half-andhalf allergic and non-allergic'.

Dr. Adam believes that there exists a 'toxic factor' in all cases of bronchial asthma and that the proper recognition of this fact is most important from the point of view of the treatment of the condition. It is considered that allergy tends to grow on a 'toxic soil' and therefore detoxication of the patient plays an important part, even in the treatment of allergic arrange. It is only in a minority of cases that a special an important part, even in the treatment of allergic cases. It is only in a minority of cases that a special allergen may be more important for successful treatment. This 'toxicosis' is supposed to be brought about by a 'sluggish liver' and 'sluggish adrenal function'. According to the author, the most satisfactory evidence of the presence of the toxic state lies. factory evidence of the presence of the toxic state lies in the results of treatment along detoxicating lines, whereby the sallow complexion of the chronic asthmatic clears side by side with the improvement of the asthma. The observations of the different workers regarding the biochemical changes in asthma would, no doubt, tend to support the presence of a basic toxic factor in all cases of asthma.

The general treatment consists 'largely in changing the patient's habits as to food, clothing, exercise and the patient's habits as to food, clothing, exercise and environment—in short, it is a problem in hygiene'. 'The aim of this treatment is three-fold: (1) to rid the patient of toxic material, protein or other, (2) to help enzyme action, intracellular or secretory, (3) to tone up the involuntary nervous system with its partners, the adrenals and the skin'. Digestion should be improved, it may be necessary to give acid-pepsin mixture. A daily movement of the howel is essential mixture. A daily movement of the bowel is essential, in addition a weekly mercurial, followed by saline should be given regularly for one or two years. At the outset, it may be necessary to lavage the colon once or twice a week. The food should contain adequate supply of calcium and the different vitamins, in this connection food may have to be supplemented by special preparations of calcium and vitamins. Sugar, especially in the form of sweets, should not be taken in excess. The patient should be encouraged to take open air exercises and lead an active life.

The book will certainly help the general practitioner in tackling the difficult problem of treating the chronic, intractable cases of bronchial asthma.

# ROENTGEN TECHNIQUE.—By Clyde McNeill, M.D. 1939. Baillière, Tindall and Cox, London. Pp. ix plus 315, with 268 illustrations. Price, 27s. 6d.

THE present volume deals mainly with roentgen anatomy and positioning of the patient.

In many instances line drawings of remarkable clarity have been substituted for half-tone reproductions of skiagrams—a scheme which has much to recommend it.

The reader's convenience is further catered for in the arrangement of the descriptive matter and illustrations. The two pages facing the reader usually contain a complete description of one position—illustrations on the left, descriptive matter on the right. Furthermore, on the left hand page, below the photograph of the patient and apparatus in position, is either a line drawing or half-tone print of the normal appearances.

The standard positions are described so that the whole procedure can be carried out with simple apparatus, and therefore the book should be of particular interest to those who have to work with the cheaper types of apparatus, either in small hospitals or private consulting rooms.

The style is concise and clear. Most of the procedures are described in as few words as possible; but references have been added in some cases for the benefit of those who wish to see the original papers.

Owing to its small compass the work is necessarily incomplete; but, it is amazing how much correct and valuable information the author has condensed in a small volume.

J. A. S.

MARIHUANA: AMERICA'S NEW DRUG PROBLEM ARIHUANA: AMERICA'S NEW DRUG PROBLEM.
A SOCIOLOGIC QUESTION WITH ITS BASIC
EXPLANATION DEPENDENT ON BIOLOGIC AND
MEDICAL PRINCIPLES.—By Professor Robert P.

1938. J. B. Lippincott Common MEDICAL PRINCIPLES.—By Floressor Robert P. Walton. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. ix plus 223. Illus.

Cannabis sativa or Indian hemp grows spontaneously almost all climates and places and is easily ilable. It is perhaps the oldest narcotic which has available. It is perhaps the human race and its use in been indulged in by the human race and its use in one form or another prevails all over the world. The one form or another prevans an over the world. The drug is habitually used to a considerable extent in India, Egypt, North Africa, and Central Asia, and millions of people are addicted to it. In his admirable monograph Professor Walton has made an attempt to make a survey of our present knowledge of 'hashish' or 'marihuana' as it is called in America. Its use during the last ten years has become a serious menace to the population of some of the states in the United States of America and Mexico and has been a source of great anxiety to the Bureau of Narcotics. The drug is smoked in form of cigarettes known as 'reefers', 'muggles', 'Indian hay', 'tea' and goof butts

The marihuana or Cannabis indica problem is not connected with any one section or community or country. It appears to be a universal evil affecting the young and the old, the rich and the poor, rural and urban areas. Even the school children are taking to its use. Of particular value to the professional reader are the chapters devoted to acute and chronic effects of hashish, in which the author has analysed the recorded descriptions of its effects and has carefully classified them. The drug affects the entire nervous system, especially the higher nervous centres. Illusions, inordinate and senseless laughter, loss of idea of time and space are among the first effects observable. The intense intoxication may lead to uncontrollable irritability. which may lead to crime. Amnesia often occurs and there may even be transient mania; permanent insanity is also said to occur. Save in extreme cases, deprivation of the drug appears to cause no serious abstinence symptoms in marihuana addicts, and the tendency to chronic addiction is much less than that observed with the drugs such as morphine, heroin, cocaine, etc. These facts, together with the relatively low degree of physical deterioration associated with the use of hemp drugs, in moderation, have, of course, been known for a considerable time. Professor Walton, however, rightly stresses that the most serious aspect of the problem in America is the extent to which the promotes in America is the extent to which the vice promotes juvenile delinquency, serves as an introduction to more dangerous drugs, and increases the use of extreme violence by criminals.

Any attempt to eliminate the marihuana habit must be based on accurate scientific knowledge of the drugits origin, growth, and the various forms in which it is taken and its name to see the control of the control o is taken, and its physiological and harmful effects. So far there has been no such scientific work on the subject except perhaps the recent work of Chopra and Chopra in India (I. J. M. R., Memoir No. 31, July 1939). Professor Walton's book will be equally of interest to the layman and the professional readers, and deserves wide publicity. deserves wide publicity.

THE LOUSE: AN ACCOUNT OF THE LICE WHICH INFEST MAN, THEIR MEDICAL IMPORTANCE AND CONTROL.—By Patrick A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H. 1939. Edward Arnold and Company, London. Pp. ix plus 115. Illustrated. Price. 7s. 6d. Illustrated. Price, 7s. 6d.

Wars have a way of changing values and altering emphases, of both individuals and things, of the builders and of iron ore, and, whether we consider the louse as an individual or a thing, the war certainly has, as one of its minor results, underlined arthropod. The louse, a social stigma in some of munities, evidence of virility in others, is to the soldier in the trenches and to the refugee seeking shelter

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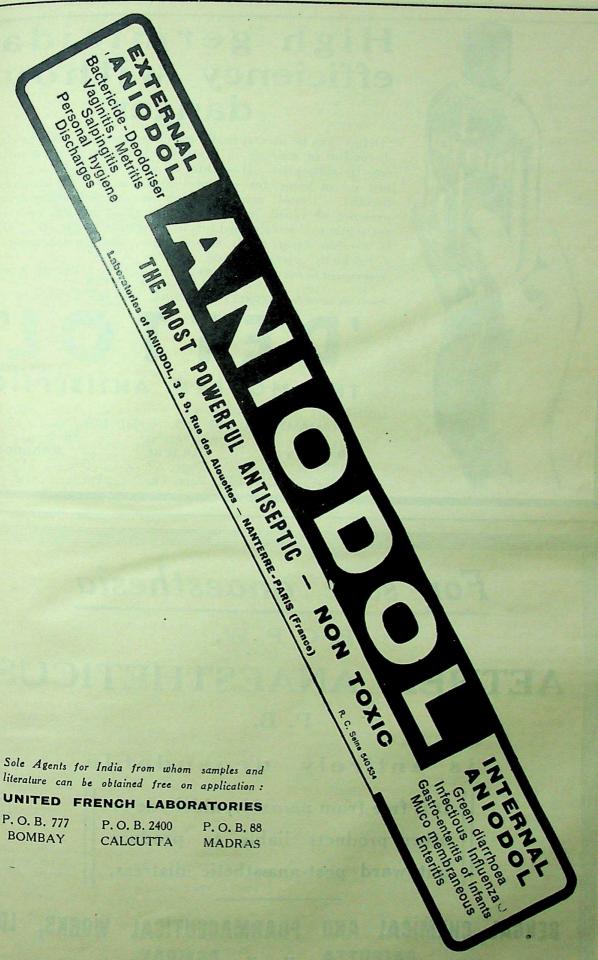
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a foreign country just an unpleasant fact and a subject of daily struggle. Professor Buxton's book is therefore not only welcome but very opportune. It was not, however, a hurried production rushed into print to catch a popular demand, but a well-considered treatise which would have formed, and we hope still will form a chapter in a more comprehensive work on medical entomology. Professor Buxton, possibly because his interest was stimulated during the Mesopotamian campaign in the last war, has always paid special attention to the louse and, in fact, if the reviewer may generalize from his own association with the writer, is seldom without one of these arthropods on his person, not of course at large, but confined in one or other of his ingenious devices shown on pages 99 to 101 of this excellent book.

Anyone interested in the louse from a personal, from a sanitarian's or from a medical point of view will find this book invaluable. The chapter on the entomology of typhus and trench fever is one of the clearest expositions on the ætiology of these diseases that the reviewer has had the pleasure of reading, and for this reason he can strongly recommend the book to anyone interested in either typhus or lice-borne relapsing fever (though he cannot subscribe fully to the author's statement that epidemic typhus fever never occurs in India, or on the other hand that lice are common, generally, in India—the Bengali doctor often sees his first louse while he is taking his post-graduate course in Europe). For entomologists, it is of course essential that they should acquire a copy of this excellent

CONSERVANCY FOR TEA ESTATE LABOURERS IN INDIA: A DISCUSSION ON METHODS OF MEETING SOME OF THE DIFFICULTIES ENCOUNTERED IN INTRODUCING THE BOREDHOLE TYPE OF LATRINE.—By B. A. Lamprell, M.R.C.S., L.R.C.P., and G. C. Ramsay, C.I.E., O.B.E., M.D., Ch.B., D.T.M. & H. (From the Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine.) Published by Ross Institute Industrial Advisory Committee. Pp. 31. Illustrated

This brochure is a good practical account of how bored-hole latrines should be constructed. It also describes the main objections and difficulties of construction of this type of latrine on tea estates in India, and how they may be overcome.

Written as it is by a practising tea garden medical officer and an ex-tea garden doctor who is still closely associated with the health problems of the industry, it should carry more weight than one written by an outsider, who could be criticized as not knowing the difficulties and objections from personal experience.

It is supported by statements of three progressive tea estate managers who advocate this system of conservancy. This should do much to combat the opposition to these latrines that still unfortunately exists in certain districts.

The brochure contains a full description, including costs and drawings, of how bored-hole latrines should be constructed and if these are closely followed, and not modified out of all recognition as such instructions frequently are by individual managers, it should do much to overcome the opposition to their introduction. It should be, and no doubt it is, in the hands of all tea estate managers.

P. A. M.

BIBLIOGRAPHY OF NUTRITION IN INDIA.—By N. Gangulee, C.I.E., Ph.D. 1940. Oxford University Press, London, Humphrey Milford. Pp. vili plus 79. Price, Rs. 3. Obtainable from Oxford University Press, Bombay and Calcutta

This is a bibliography that both the physician and the research worker will find very valuable. Work on nutrition has only been taken up seriously in India during the last few years, but the references already make a formidable array.

Dr. Gangulee has done a valuable service to workers in India by compiling this useful bibliography. It is a book that should be in every medical library in this country.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. 237. 'BREATHING MACHINES' AND THEIR USE IN TREATMENT: REPORT OF THE RESPIRATORS (POLIOMYELITIS) COMMITTEE. Published by His Majesty's Stationery Office, London. 1939. Pp. 90. Illustrated. Price, 2s.

The preface of this report not only gives an excellent idea of the scope of the book but summarizes the findings in a way that, we think, will interest our readers. We have therefore reproduced it in extenso.

'This report summarizes the present state of development of mechanical apparatus for preventing asphyxia due to respiratory paralysis. Under their more striking but less accurate description as "iron lungs", these machines have become a subject of widespread interest in recent years, because of certain reported cases in which they have maintained the lives of individuals who otherwise would have been expected to die at once. Before the subject received the increased newspaper publicity which followed the generous offer by Lord Nuffield to manufacture the Both type of machine and supply it free of charge to hospitals throughout the Empire, the Council had already appointed a Committee to examine the various forms of machine available and to consider the problem from the physiological point of view, as well as with regard to questions of cost and distribution. The immediate stimulus to this action was a request to the Council from the Ministry of Health for guidance regarding the supply of these machines, and as to their respective merits for the treatment of cases of respiratory paralysis, particularly in acute anterior poliomyelitis. The epidemic of poliomyelitis in England and Wales in 1938, although small in comparison with some of those which have occurred in other countries, was nevertheless attended by a number of cases of respiratory paralysis sufficient to demand serious attention from this point of view'.

'Artificial respiration is, of course, needed in many other conditions than poliomyelitis. Asphyxia is usually an acute emergency, so sudden that every adult should be able to carry out artificial respiration by hand, and so brief that the manual method is generally all that is required. Its commonest causes are carbon monoxide poisoning and drowning, and for these immediate treatment by the manual method is essential. There are, however, instances—such as certain cases of poliomyelitis and diphtheria—in which spontaneous breathing remains in abeyance for so long that artificial respiration by hand becomes not only tedious but wholly impracticable, and for these some form of breathing machine is necessary.'

'When the Committee started work the problem to be studied appeared relatively easy, for most medical men were familiar only with two types of breathing machine—the Drinker apparatus or "iron lung", and the Bragg-Paul "pulsator". These represented two different principles of artificially maintaining the action of the lungs, which might be briefly described as negative and positive pressure methods. Further consideration, however, revealed that the problem was one of great complexity. Instead of two, there were many types of apparatus to be considered; and the best type of machine for one condition was not necessarily the best for another condition. Again, cost had to be considered, and also the degree of skill and amount of attention required for efficient working of any machine. On such points as these, moreover, rested the decision as to the best means of maintaining a service that would work effectively throughout the country. All these questions and many others are considered by the Committee in the following pages. They describe the great majority of the machines available; they discuss the advantages and disadvantages

of these, the relative cost, the kind of assistance necessary for operation, and the policy to be adopted in order to meet sudden demands for supply.

The Committee point out that the practical useful-'The Committee point out that the practical usefulness of even the best type of breathing machine must always be strictly limited and that it is much more important for all members of the community to be familiar with manual methods of artificial respiration. The application of artificial respiration by hand must never be postponed in an emergency through the mistaken idea that a patient can be better treated with a machine. Paralysis of respiration of sufficient degree and duration to demand treatment in a breathing machine is evidence of a very profound disturbance of the organism; and, if a patient is really ill enough to require such treatment, he is very likely to die whatever is done. It is estimated that, even in a peak year for poliomyelitis, the annual incidence in Great Britain and Ireland of all forms of respiratory paralysis likely to benefit from treatment in breathing paralysis likely to benefit from treatment in breathing machines will not exceed 600, and only in a few of these cases will the treatment be truly life-saving.

In view of the relatively small number of patients annually requiring treatment in breathing machines, the necessity for highly-skilled medical supervision and nursing, and the desirability of progressive improvement in design of the instruments used, the Committee strongly recommend that mechanical facilities for the strongly recommend that mechanical facilities for the care of cases of protracted respiratory failure should be concentrated in the smallest possible number of hospitals—instead of being widely dispersed as at present—and that, in general, the patient should be taken to the machine rather than the machine to the patient. They suggest that fully equipped units for the treatment of acute anterior poliomyelitis might appropriately be created in each regional area, and that the treatment of prolonged respiratory failure due to the treatment of prolonged respiratory failure due to poisoning and other causes should also be concentrated at one or more large hospitals in each area.'

'Finally, the Committee emphasize the need for further clinical research to determine the relative merits of positive and negative pressure methods of mechanical of positive methods of pos of positive and negative pressure methods of mechanical artificial respiration, with the ultimate object of developing a machine which may be equally suitable for all forms of respiratory paralysis. They point out that the incidence of respiratory failure in acute anterior poliomyelitis is probably too small in this country for the work to be done effectively here; but they suggest that such an inquiry carried out in a country where that such an inquiry carried out in a country where that such an indicate the disease is more common might give results of great importance, and they indicate a scheme of investigation which might usefully be followed by a

AIDS TO GYNÆCOLOGY.—By W. R. Winterton, M.A., M.B., B.Ch. (Camb.), F.R.C.S. (Eng.), Ballilère, M.R.C.O.G. Ninth Edition. 1939. Ballillere, Tindall and Cox, London. Pp. vii plus 184. Illustrated. Price, 3s. 6d.

having reached its ninth lated. The book has been Aids to Gynæcology' edition is to be congratulated. brought up to date and almost all diseases and conditions which can occur in gynæcology have been mentioned and described, albeit of necessity very briefly.

To write a book of this nature is an extremely difficult task, for the condensation of knowledge is fraught with the danger of leaving unmentioned

important items.

Mr. Winterton has however not been guilty of this dereliction so that this edition of the 'Aids' will continue to serve the purpose of the original one, and assist students to group together and tabulate the science of gynæcology so that they may be enabled to get the fullest value out of their textbooks. The volume would also be useful as a heading notebook for a lecturer.

H. E. M.

# Abstracts from Reports

SEVENTY-FIRST ANNUAL REPORT OF THE DIRECTOR OF PUBLIC HEALTH OF THE UNITED PROVINCES FOR THE YEAR ENDING 31ST DECEMBER, 1938

The high incidence of cholera after the Kumbh fair at Hardwar in April 1938 was the chief epidemiological feature of the year. During the year under report deaths from cholera numbered 70,622 against 6,341 in deaths from cholera numbered 70,622 against 6,341 in 1937. The rate per mille of the population for the two years was, respectively, 1.46 and 0.13 and the mean for the previous five years was 0.24. The maximum number of deaths, 21,013, occurred in June and the minimum, 55, in February.

There were 13,436 deaths from plague against 24,036 in the previous year. The rate per mille of the population for the two years was respectively 0.22 and

lation for the two years was, respectively, 0.28 and

0.50 and the mean for the previous five years was 0.46.

The deaths from this cause during the last decade were as follows:-

Years	Deaths	Years	Deaths
1928	80,943	1933	9,835
1929	37,678	1934	47,688
1930	10,946	1935	23,019
1931	31,225	1936	7,290
1932	21,497	1937	24 036

The total number of deaths from smallpox during 1938 was 4,411 as compared with 3,200 in 1937. The death rates for the two years were, respectively, 0.09 and 0.07 and the quinquennial average 0.28. The deaths amongst infants under one year of age were 1,202, between the ages of one to ten years 1,645, and the rest among adults.

The number of assistant superintendents of vaccination and vaccinators employed during the year under report was, respectively, 49 and 950 against 49 and 953 in the preceding year.

The Vaccination Act is in force in all municipalities, cantonments, notified areas and in certain town areas.

During the year the total cost on vaccination in the province amounted to Rs. 3,83,537 against Rs. 3,90,102 in the preceding year. This was exclusive of the charges of assistant directors. of assistant directors of public health, their establishment, contingencies, as well as the expenditure on maintenance of the Government Vaccine Depôt. Out of the total expenditure of Rs. 3,83,537 a sum of Rs. 3,07,988 was incurred in rural areas and Rs. 75,549 in urban areas. in urban areas.

The average cost of each successful case of vaccination in these grants are not report tion in these provinces during the year under report was annas three and pies eight, against annas three and pies nine in the preceding year.

During 1938, fevers were responsible for 940,469 deaths as against 792,263 in 1937, the death rates being 19.43 and 16.17, respectively. The mean ratio for the last five years was 17.53. The highest mortality (99,247) last five years was 17.53. The highest mortality was recorded in May and the lowest (61,927) in March was recorded in May and the lowest (61,927) in March 819,057 deaths were due to malaria, 103,114 to 528 to fevers, 8,709 to enteric fever, 8,544 to measles, 84 to influenza, 249 to relapsing fever, 155 to kala-azar, black cerebro-spinal fever, 23 to typhus fever and 6 to be water fever. These figures cannot, however, absolutely relied upon as the reporting of deaths the hands of village chaukidars, who are not competent to find out the true causes of deaths. During 1938, fevers were responsible for 940,469 paths as against 700,000

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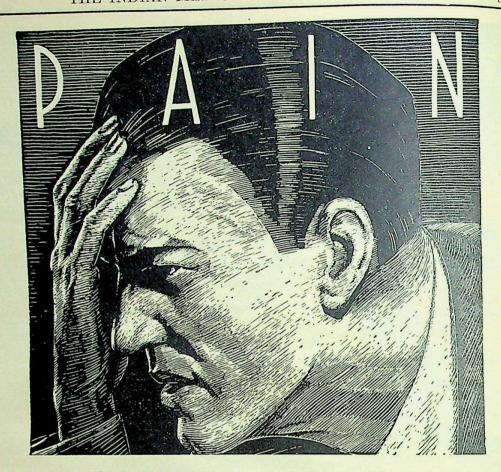
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Two hundred and forty-nine deaths were recorded during 1938, as having occurred from relapsing fever, 8.709 from enteric fever and 155 from kala-azar. The corresponding figures from these diseases for 1937 were 227, 9,366 and 184, respectively.

The number of deaths reported from influenza during the year under report was 528-249 from urban areas

and 279 from rural areas.

During 1938, dysentery and diarrhœa were responsible for 21,015 deaths representing a death rate of 0.13. corresponding figures for the preceding year were 17,126 and 0.35, respectively, and the mean ratio for the previous five years 0.34.

#### Respiratory diseases

These diseases were responsible for 46,957 deaths as compared with 44,628 in the preceding year. The death rates for the two years and the mean for the previous five years were 0.07, 0.92 and 0.89, respectively

The incidence of cerebro-spinal meningitis was again low this year. The total number of deaths reported from this disease was 84 against 158 in the preceding year. Of these 74 deaths were reported from towns and 10 from rural areas.

Epidemic dropsy was responsible for 90 deaths compared with 64 in the preceding year. Of these, 65 were reported in urban areas and 25 in rural areas.

During the year 1938 a large number of bored-hole latrines were constructed in villages, and there is a demand from the better class rural population for such latrines to serve as domestic privies. In the Fyzabad district alone, 46 such latrines were constructed in the

The medical officer in charge of the Partabgarh Health Unit, as the result of field experiments carried out in the health unit area, drew up plans and specifications for a 'bored-hole' type of absorption pit to receive house sullage. These have been circulated and in places where they have been put up, have been found to be for superior to the scalegor pits that used to be far superior to the soakage pits that used to be constructed before. Such pits are particularly suited for village schools, market places and fairs. When provided with foot-rests they can serve as urinals, These pits require less space, are more economical and do not need much care for maintenance. They are thus a great improvement over the cesspools which are a source of great nuisance in villages, and need the daily services of sweepers to look after them to prevent them from overflowing.

Eight new maternity centres were opened during the year under report. Total number of centres is now 301 (147 rural and 154 urban).

There is no Red Cross maternity hospital in the United Provinces. Clinics were held at maternity and child-welfare centres. The staff paid ante-natal and post-natal visits, trained indigenous dais and organized baby shows, magic lantern demonstrations and lectures during exhibitions, fairs, etc.

The total number of cases conducted by the staff with or without dais was 47,950 while that of cases not attended to by Red Cross workers in the same area was 111,000. was 111.294. The Director of Maternity and Child-welfare inspected the maternity and child-welfare work both in rural and urban areas of 18 districts. During the course of these inspections she also saw expectant mothers and babies in their homes and afforded the necessary advice to workers and the public.

The training of probationer assistant midwives in

The training of probationer assistant midwives in domiciliary midwifery and house-visiting was, as usual, undertaken midwifery and house-visiting was, as usual, undertaken at the Provincial Training Centre, Lucknow, and was supplemented by three months' hospital training and was supplemented by three months' hospital training at the Dufferin Hospital and one weekly lecture and demonstration at the Queen Mary's Hospital. Twenty-six probationers were declared successful during March and September examinations and were awarded the certificate by the State Medical Faculty.

Facilities for the state of the supplementary and the certificate in the supplementary and supplementar

Facilities for midwifery training also existed in the Cawnpore maternity and child-welfare centre. The Dufferin Dufferin and mission hospitals also trained these workers for their own needs.

A serious effort continued to be made to train dais especially in the 25 maternity and child-welfare centres where medical women or health visitors were employed and also in the Health Unit, Partabgarh. A few dais were trained in connection with the rural development

It has been calculated roughly that of all the school boys examined, about 20.9 per cent have one defect only, 14.5 per cent have two defects and 10.1 per cent have more than two in the urban areas as compared to 34 per cent, 13 per cent and 7.5 per cent, respectively, in the previous year.

It will thus be seen that there were not less than 55.5 per cent defectives to share all the defects as compared with 54.5 per cent in the previous year in

the urban areas.

Poor nutrition.-In the larger urban areas this defect was found to be 19.4 per cent as compared to 12 per cent

in the last year.

Of the five bigger towns, Cawnpore has recorded the highest figure of 22.5 per cent and Lucknow the lowest 10.7 per cent. In the eight smaller municipalities there is a great variation in the observations, Meerut recording the minimum percentage of 9.43 and Bareilly the maximum of 43. In the rural areas this percentage was 18.1 as compared to 18.3 in the last year. Such a wide variation is chiefly due to personal factors of the officers concerned and lack of definite standards and means of judging the condition.

Poor nutrition is not so much due to poverty as to lack of knowledge about balanced diet. The school health officers give suitable advice on this subject both at the clinics and in the schools while delivering

lectures.

## THE NINTH ANNUAL REPORT OF THE ASSOCIATION FOR THE PREVENTION OF BLINDNESS, BENGAL, 1938-39

THE Association has now completed the ninth year its existence. It has grown into one of the chief utility services in Bengal, and has amply justified its existence by the amount and quality of the services rendered to the Province in general. It is gratifying to note that mass consciousness is gradually awakening to the problem of prevention of blindness, and the diagnosis and the cure of eye diseases.

The committee has been inundated with appeals for assistance at the different centres of its activity; but it is much regretted that many had to be turned down, owing to the still limited resources at their command. Enquiries for help and advice continue to pour in from other provinces, especially with regard to the equip-ment and the establishment of travelling dispensaries, in the starting of which work it is our proud privilege to be pioneers in the field of India. The idea was adopted from Egypt but the dispensaries were equipped in a far less ambitious way than in that country owing to insufficient funds.

During the year under review, an innovation has been made in the activities of the Association, namely, the eye examination of children in schools and orphanages of Bengal. This has been neglected in the past, and is now being gratuitously done by one of the trained

honorary workers.

The work done by the two travelling eye dispensaries of the Association, namely, the Jubilee Travelling Eye Dispensary and the Travelling Eye Dispensary No. II, has been enormous. Each unit has two medical Travelling officers who carry out propaganda work in the prevention of blindness and care of the eyes, by lectures. lantern demonstrations, cinemas, posters and pamphlets, etc. Systematic eye examination of school children was arranged and sample surveys of blindness in the villages were undertaken. Lectures in schools and public places were given and, in addition, they carried out routine curative work in subdivisional hospitals, and, where available, in private hospitals. Operative work was undertaken at most centres the dispensaries visited, and where indoor accommodation was available. All operative work is suspended one

week before the dispensaries are due to move on so that none of the operative work carried out can be left to the care of untrained assistants. The travelling dispensary can only stop in a district for about three months and it was often distressing to have to turn down the memorials and requests of the inhabitants for an extension of stay of the dispensary. Owing to lack of funds any extension of time for the dispensary could only be granted when the local public contributed the amount for the upkeep of the dispensary for the extended period. This works out at four hundred rupces a month.

As in our last annual report we once again state for

information and guidance:

In the campaign for the prevention of blindness it is perhaps not yet realized that the problem is largely one of the prosperity of the people and the great bulk of preventible blindness will gradually diminish as the standard of living improves.

Speaking broadly, the prevention of blindness in India is not only a medical problem but a social, economic and financial one. All of India's major problems to-day including prevention of blindness, resolve themselves into, or are closely connected with, the education of the masses, the greater number of whom are the cultivators. During the year under review many comprehensive schemes have been launched by Government for rural uplift and natural constructive work to improve the conditions of the life of the villagers. Large sums of money are being spent to provide good water supplies, improved methods in the breeding of cattle, union board dispensaries, village schools, libraries and playing grounds. The fulfilment of these schemes must lead to a general improvement of the health of the people and as a corollary a diminution in the amount of preparable blindness. diminution in the amount of preventible blindness.

As has been mentioned times out of number, the common causes of blindness in Bengal are apathy, ignorance and poverty. How are we to overcome these enemies? This must come from the awakening of the masses, which can be the only remedy for the devastating scourge of what we call 'unnecessary blindness'. This must necessarily be a tremendous task and will not be crowned with success until there is co-operation between the Government and the people to bring into practice the resources of modern mass education by means of lectures, radio talks, and cinema shows, and the world offers no fairer field for the exercise of wisely-directed enthusiasm. The Association for the Prevention of Blindness, Bengal, has been trying to co-ordinate the work and educate the lay public in the importance of the movement for prevention of blindness.

The committee are pleased to report that their work has been appreciated by the State, and as a practical proof of its appreciated by the State, and as a practical proof of its appreciation the Government of Bengal have sanctioned a grant of Rs. 15,000 for the ensuing year. This sum will enable the committee to start two more travelling dispensaries, making four in all, and to be in a better position to meet the popular demand for increased help. It has been our ambition to have five travelling dispensaries in the province, and in our next report we hope to announce that this is a

fait accompli.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE (UNIVERSITY OF LONDON) INCORPORATING THE ROSS INSTITUTE: REPORT ON THE WORK OF THE SCHOOL FOR THE YEAR 1938-39

THE reports of the heads of the various departments

The reports of the heads of the various departments of the School on the academic year 1938-39 had been prepared prior to the outbreak of war, and it has seemed desirable that they should be published notwithstanding the changed circumstances.

A record number of students attended the principal courses of instruction during 1938-39; the school's income from tuition fees and from voluntary contributions was higher than on any previous occasion. butions was higher than on any previous occasion; and, in spite of the fact that many members of the staff were preoccupied with work of national importance

outside the sphere of their ordinary duties, the school outside the sphere of successful year as regards both had an active and successful year as regards both had an active and successful the second and research. In accordance with instructions the University, the School successful the University, the School successful the second seco teaching and research. In accordance with instructions received through the University, the School suspended its normal activities on the declaration of war. Whether the recommence any teaching determined to recommend the reaching decisions. its normal activities of the recommence any teaching during it may be possible to recommence any teaching during the war is uncertain, but it is hoped to keep together a nucleus of the staff if not in London then in accommodation that has been reserved for the School at

Cambridge and elsewhere.

The Board of Management suffered a heavy loss by the death, in December, of Sir E. Cooper Perry.

Sir Cooper was a member of the Committee, set up Sir Cooper was a memory of the Committee, set up in 1921 by the Minister of Health, under the Chairman-ship of the Earl of Athlone, which recommended the foundation of the School. He was appointed in 1924 to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the first to represent the University of London on the University of London on the first to represent the University of London on the Board of Management; and shortly afterwards he became chairman of the finance committee and subsequently of the board. The successful establishment of the new school and its rapid development during the next fourteen years were in a large measure due to his wise guidance, and his loss is deeply felt by the board

and by the staff alike.

Fortunately for the school Lord Harlech generously undertook to succeed him as Chairman of the Board of Management in spite of the many calls on his time. Members of the board are confident that his wide experience of public affairs in general and of colonial administration in particular will be of the utmost service when the school is able to resume its normal activities once more. Another new and valuable member of the Board of Management is Sir Dougal Orme Malcolm who was co-opted a member in February 1939.

Although there were certain unavoidable increases in expenditure the accounts for the year ended 31st July, 1939, again show a small balance on the right side. This result was due to the fact that, in spite of the uncertain political situation that existed throughout the year, there was an increase in the receipts from voluntary contributions and a record income from students fees. Apart from the expenditure shown in the school's general account sums totalling rather more than £25,000 were expended on research in the school and in the associated Institute of Agricultural Parasitology by various outside bodies which included the Medical Research Council, the Ministry of Agriculture and Fisheries, the Ministry of Health, the Department of Scientific and Industrial Research, the International Wool Research Secretariat, the Royal Society, Imperial Chemical Industries, and the Milk Marketing Board.

In last year's report reference was made to the proposed reorganization of the India Branch and the steps being taken to bring this about. A meeting took

steps being taken to bring this about. A meeting took place in London on 7th October, 1938. The position of the branch was discussed, and it was agreed that a representative body in Calcutta to administer the Branch was advisable.

Branch was advisable.

When it was known that Mr. E. A. Watson was visiting India he was invited by the India Branch Sub-Committee of the Standing Committee to establish a committee of the Ross Institute in Calcutta.

The committee will be known as the Committee of Control, Ross Institute of Tropical Hygiene, India Branch, with its headquarters at Royal Exchange, Calcutta.

The committee will be responsible for the administration of the Party Toward tration of the Ross Institute in India and will forward the work of the branch in the best interests of the subscribers and for the best interests of the subscribers and for the best interests. subscribers and for the benefit of industry generally. The accounts and funds have been handed over as from the 31st July, 1938, the data between handed over the 31st July, 1938, the data between handed over the subscriber of th the 31st July, 1938, the date of the last audit.

Progress of Malaria Control on Tea Estates in India

The results which have been obtained by the trustery in Indiana. industry in India during the comparatively short period of eight years are remarkable to the comparative tribute to of eight years are remarkable and a great tribute to the work of the estate medical officers, superintendents managers and planters. managers and planters. They are also a tribute the Ross Institute, which has been primarily responsible for making measure responsible for making malaria control a routine measure on many estates. It has been primary on many estates. It has been proved by many

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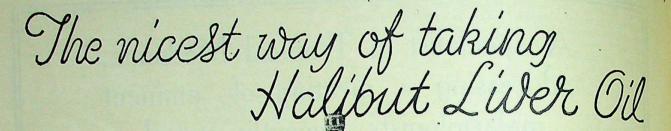
ndia

eriod e to lents A specialist in Tropical Medicine, addressing a meeting of eminent malariologists, recently stated:

"I am definitely of the opinion that prophylactic quinine does prevent actual attacks of malaria. Once or twice the experiment was tried of withholding prophylactic quinine for a week or two from large groups of men. This was followed by such increases in the sickness rate from malaria that a rapid return to the prophylactic dose was made."

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responsible medical officers beyond argument that the control of malaria is not only possible but is an important economic factor in reducing the costs of running an estate.

The India Branch of the Ross Institute to-day consists of a Principal, Indian assistants and research centres, subsidized by the Ross Institute. But, in addition, a large group of medical officers and planters are working in close association with the Ross Institute; they are, in fact, if unofficially, a part of the Ross Institute's organization and an essential part. Progress started with Dr. G. C. Ramsay's original work at Labac, started with Dr. G. C. Italians, which malaria could be which indicated the lines on which malaria could be which indicated the lines on which malaria could be controlled economically in Assam as in Malaya. To enable his work and knowledge to become available to the whole Indian Tea Industry, the branch was founded in 1930 and the full-time services of Dr. Ramsay obtained. The Branch opened, equipped and subsidized a number of field research laboratories in different parts of Assam and Dooars, under estate medical officers, who readily gave their voluntary services to supervise the work. These centres were not only of great value to the institute and to the tea estates in the prevention of malaria, but they were also helpful to the medical officers in solving problems in connection with other diseases.

The tea industry owes much to Dr. D. Dr. G. Fraser, Major C. S. P. Hamilton and Dr. G. C. Harrison, who have been indefatigable in advancing knowledge of the control of malaria and other diseases in Northern India tea gardens. Southern India was not overlooked, and we are also indebted to Dr. J. E Measham for organizing the first Ross Institute Field Station in Southern India. This was followed by other research centres in Southern India, and we have had the valuable assistance of Dr. P. K. Govindan Nair. There are many other doctors in Assam whose cooperation and help have been of great value, especially Dr. F. C. McCombie, Dr. B. A. Lamprell, Dr. G. G. Terrell, Dr. G. Macdonald, Dr. H. C. Berlie and Dr. W. N. Stirling.

In the chief field stations it was possible to train a staff of Indians as malaria surveyors and laboratory assistants who would be absorbed by the estates to assist in the control of malaria. The number of Indians trained in this work by Drs. Manson, Fraser and Measham and others now exceeds 400. The majority of these are employed by the tea industry and are on the pay-roll of estates. Industries outside tea also employ Indiana trained at the Poor Intibite centure.

employ Indians trained at the Ross Institute centres.

The co-operation of the individual planter is of primary importance. Unless the planter himself is interested in the control of the individual planter himself is interested in the control of interested in the control of a disease and realizes that it is just as necessary for him to have a healthy labour force as it is to have healthy tea bushes, malaria control work cannot succeed. To deal with this side of the work an annual Malaria Control Course for laymen was started at the Ross Institute in 1929, when about a dozen attended. It is estimated that over 1,000 persons have attended the course since it began, and that 590 of these were planters. This year, as is detailed later in this report, the attendance was 222, of whom 120 were tea planters from India. The course

During the past eight years Dr. G. C. Ramsay has visited practically every tea estate in India, many several times, and the demand for his services has been so constant that the time he has been able to spend on individual gardens, by force of circumstances. spend on individual gardens, by force of circumstances, has been limited and beautiful to has been limited. Subscribers have also asked him to help in other directions, which has resulted in useful work being done in certain sugar districts, in jute mill areas control on various mines. areas, cotton ginning factory areas, and on various mines

# The Control of Malaria on Estates

Dissections of thousands of mosquitoes at various at Labac that the only anopheles mosquito we have to control in the Dooars and Assam is A. minimus. The possibility of other carriers is not overlooked, but

so far our control is directed against the one species A. minimus. In Southern India A. fluviatilis is the principal carrier in the Anamallais and Meppadi areas. In the Peermade district two species have been incriminated, A. fluviatilis and A. culicifacies. Having found the species responsible for carrying malaria, our efforts have been directed against the breeding places of known vectors and other species are ignored. This is known as 'species sanitation' and is the most economical method of dealing with malaria in settled populations.

It was known in Malaya as far back as 1909 that certain malaria carriers could be controlled by the preservation of dense shade. In Assam it was demonstrated that A. minimus could be controlled by the growing of dense shade over channels and streams and in swamps. Where this can be done it is one of the cheapest methods of control. The shade plants mostly grown in Assam are Duranta, Hibiscus, Basak, Lantana, Eupatorium, Tarapat and Bamboo, and in Southern India, in addition to Tarapat and Duranta, leafy plants such as Nilgiri Weeds, Wild Camphor and Wild Cardamom are being used. Other methods of control are employed according to circumstances, such as oiling. Paris green flushing draining vertical as oiling, Paris green, flushing, draining, vertical draining, stone packing, oil booms, shading the edges of tanks, etc. Many experiments have been made with drugs. Prophylactic measures by drugs give only temporary results and are resorted to only in exceptional circumstances. Where the breeding places of the mosquitoes are properly controlled the use of drugs, except as treatment, is unnecessary

Detailed information regarding the modern method of flushing streams by means of a siphon has been circulated through the Industrial Advisory Committee of the Ross Institute. The use of siphons was introduced by Dr. C. Maddendald. introduced by Dr. G. Macdonald in Ceylon, and this method is now widely used to control streams on tea gardens in Ceylon. The siphon was demonstrated at the Malaria Control Course for laymen. Siphons can be used singly or in batteries of two, three, four and five upwards, according to the size of the streams.

The reports of the various departments and research sections are so condensed that they do not lend themselves to abstraction with any prospect of giving a comprehensive review of the many activities of the London School in the space at our disposal. We have therefore this year been compelled to confine our abstract to the remarks of the Chairman of the Finance and General Purposes Committee and the Board of Management, and to the activities of the Ross Institute in India.]

DIRECTOR'S REPORT ON THE WORK OF THE EASTERN BUREAU, SINGAPORE, LEAGUE OF NATIONS, HEALTH ORGANIZATION, FOR THE YEAR 1939

THE Deputy Secretary General in a broadcast address from Geneva on 21st October stated, among other things:—'The League will still, despite the war, find a large field of usefulness. Public Health matters will bulk very large, perhaps even larger than before the war. The League's worldwide service of epidemiological intelligence will be more and more necessary as national services become overburdened by the new emergencies, and as new epidemics, perhaps, develop out of the war in both Europe and Asia'.

Subsequently the health committee, which met in Geneva from 20th to 24th November, considered the effect of the war on the work of the health organization. It recorded the view that the permanent services must not be interrupted since their reconstruction would be exceedingly difficult. The Singapore Bureau was mentioned as one of these permanent services whose utility was universally acknowledged.

The health committee also recalled that by agreement with the permanent committee of the Office International d'Hygiène Publique, Paris, governments of eastern countries can effect notifications required under certain articles of the International Sanitary Convention, Paris, 1926, by means of the Singapore

Throughout the year, including the last four months when normal methods of communication have been so profoundly altered by the war in Europe, cabled information regarding outbreaks of the major infectious diseases and their progress has been regularly received from all eastern health administrations. In no important instance has there been inconvenient delay and consequently it has been possible for the bureau to prepare and transmit its weekly bulletin regularly on time. Perhaps nothing could have better illustrated how well established is the international system of epidemiological intelligence in the Far East, of which the bureau is the centre. Without the fullest co-operation of all the countries adherent to it, the service the bureau can render would be of correspondingly less value to each one. It must therefore be a source of much satisfaction to the countries, which worked for the establishment of the bureau in 1925, and have consistently supported it since that time, to find that the hostilities in both east and west have not interfered with the carrying out of its primary function, viz, the collection of epidemiological information from individual eastern countries and its immediate individual eastern c circulation to them all.

Wireless transmission is the principal medium for the circulation of the information received by and collated

in the bureau.

The broadcast messages have not only been continued at the usual times throughout the year, but towards the end of it there has been a marked advance in methods, which has come about because of the disturbance to normal communications caused by the war—

one example of good coming out of evil.

The opportunity is gladly taken to express our most grateful thanks to the governments and authorities directing the wireless stations who have so consistently and whole-heartedly placed their services at our disposed and have always responded so willingly to the disposal, and have always responded so willingly to the demands made upon them. They are playing a most important part in preventing the transfer of communi-

cable disease from one country to another.

1.Note.—In addition to the usual record of epidemiology of the principal diseases in the area administered by the bureau, this year's report contains summaries of recent research work. There is also an account of the special courses in malariology held annually under the auspices of the Singapore bureau. It is a report that should be in the hands of all health authorities of the countries bordering the Indian and Pacific Oceans.—Editor, I. M. G.]

# THE THIRD ANNUAL REPORT OF THE INDEPENDENT MEDICAL PRACTITIONERS' ASSOCIATION, TINNEVELLY, FOR 1939-40

The year opened with 28 members on the rolls, three new members have joined the association during the year and none left during the association held 12 clinical meetings usually on the assoc

the second Saturday of every month at Dr. L. Mahadevan's Eye Clinic, Vannarpet, when one of the members of the Association delivered a lecture which was followed by discussion by members.

The average attendance at these meetings was 14.

Besides the regular meetings there were two special

meetings.

# ANNUAL REPORT OF THE EXECUTIVE COM-MITTEE OF THE BENGAL TUBERCULOSIS ASSOCIATION, FOR THE YEAR 1939

Last year the members of the Tuberculosis Association of Bengal met in the midst of enthusiasm aroused by Her Excellency the Marchioness of Linlithgow's appeal for the King-Emperor's Anti-Tuberculosis Fund for India. This is the first report of the newly formed Bengal Tuberculosis Association with which is amalgamated the old Tuberculosis Association of Bengal. The close of the year 1939 saw the close of the appeal to which the princes and people of India

made a most magnificent response. The total collections amounted to over 80 lacs of rupees to which Bengal's contribution of Rs. 7,87,000 was the highest Bengal's contribution of the largest funds collected in this This is one of the largest funds collected in this This is one of the rangest that confected in this country for the relief of human suffering, and India will ever remain grateful to H. E. the Marchioness great contributions. of Linlithgow for making this great contribution towards the welfare of her people.

According to the announcement made by Her Excellency ninety-five per cent of the collections have been returned to the provinces; and Bengal has received back a sum of Rs. 7,57,801. Of this sum, Rs. 50,000 being donation from the Calcutta Corpora-tion was earmarked for payment to the Jadavpur Tuberculosis Hospital and has been paid to it; and a like sum representing the donation from King George V Memorial Fund is set apart for expenditure on a project to commemorate the memory of His Late Majesty King George V. The balance of Rs. 6,57,801 forms the Corpus from which only the interest is available for expenditure without the sanction of the Central Committee. By the end of the year under report a sum of Rs. 6,30,199 had been invested in Rs. 6,50,000 3 per cent loan, 1963/65, and a further Rs. 10,000 was purchased at the beginning of 1940.

This is the eleventh annual report of work in the prevention of tuberculosis and it is the first report under the new association formed as a branch of the All-India Tuberculosis Association. Although we have only been able to touch the fringe of the problem, yet when we compare our activities in 1929 when we started with only Rs. 500 and were able to look after a few hundred sufferers and compare this with our activities for the year 1939 with an expenditure of about Rs. 40,000 benefiting over 12,000 patients, visiting 35,000 homes and educating over 60,000 people in the methods of prevention of the disease, we feel a justifiable satisfaction that we have made some progress and have demonstrated the fact that this association has developed sufficiently to claim a greater measure of support from both public bodies and private individuals.

The programme of work may be resolved into the

following main factors:-

(1) To help in the organization of district branches of the association, and to prescribe rules for the purpose.

(2) To get into touch with the education and public health departments, local bodies, social workers, social complete complete the complete complet service organizations, railways, etc., and to stimulate

interest in anti-tuberculosis work.

(3) To carry out intensive educational propaganda to educate the public in regard to the tuberculosis problem and the hygiene of prevention, particularly in relation to the public in relation to the public line of prevention. relation to unhealthy habits, and injurious customs, prejudices and superstitions.

(4) To survey industrial areas, educational institutions, municipal towns, etc., to obtain information regarding prevalence of tuberculosis and to advise the authorities concerned to the content of the line with authorities concerned as to measures for dealing with the situation revealed.

(5) To establish relations with existing tuberculosis institutions with a view to aiding patients in obtaining beds for care and treatment.

beds for care and treatment.

To arrange for the training of selected medical medica officers, medical students, nurses and home-visitors anti-tuberculosis works.

(7) To set up tuberculosis clinics or dispensaries in connection with hospitals or independently and to provide them with specially trained staff, etc., (8) To arrange for the systematic visiting examination of patients and contacts by employing qualified home visitors and to render assistance patients and contacts by providing medicines, infectants and nourishment.

The above sist is not exhaustive but it indicates the main it.

The above sist is not exhaustive but it indicates the main lines of the anti-tuberculosis campaign. [A detailed account of the work performed the year under these various headings is given, indicates considerable progress has been made.

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# Physiological action of OVRIL

# Restoring normal gastric secretion after illness

In a recent series of tests on human beings,\* it was found that Bovril possessed exceptional power of stimulating gastric secretion, surpassing that shown by any other substance studied, and that the secretion was of normal hydrochloric acid content.

This is the physiological reason why Bovril should be considered an important adjunct to medical treatment.

Following most acute illnesses there is commonly a depression of gastric secretion, and the secretion is poor in hydrochloric acid. In such cases Bovril helps by stimulating the gastric mucosa and restoring the gastric juice to normal, both in volume and activity.

\*B.M.J., 1937, August 28. Page 412.

# THE IMPORTANCE OF PRECISION POLISHING

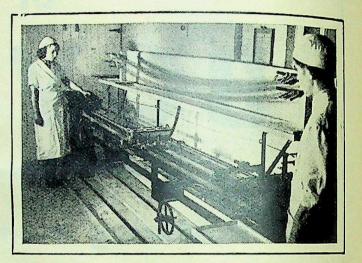
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Hand polishing of individual strands fails to obtain this desirable precision and uniformity in the production of surgical catgut strands.

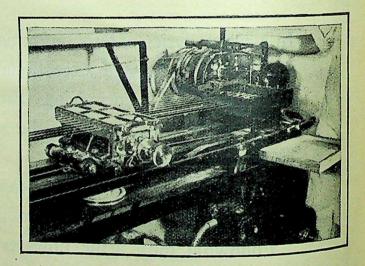
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Precision Automatic Polishing, in one operation, of twelve catgut strands, each 10 feet in length.



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THE TWENTY-SECOND ANNUAL REPORT OF KING EDWARD VII MEMORIAL THE PASTEUR INSTITUTE AND MEDICAL RE-SEARCH INSTITUTE, SHILLONG, FOR THE YEAR ENDING 31ST DECEMBER, 1938

Antirabic section.—The scheme of treatment and the preparation and dosage of vaccine remained unchanged during the year under review.

The treatment was carried out at Shillong and its authorized treatment centres which now number 24 public centres and 42 private centres. One new

private centre was authorized during the year.

Two thousand two hundred and thirty-three persons applied for treatment at Shillong and its centres, the majority, of course, at the centres. Of these persons 1.875 completed treatment and among them there were 12 deaths from hydrophobia. In addition three persons applied for treatment when they were in the late incubation stages of hydrophobia and did not complete treatment because the disease supervened during the course of treatment. All three died. In our present state of knowledge nothing can be done to save such

Thus among persons applying for treatment there were 15 deaths in all from hydrophobia during the year. There were 213 'Advice Cases' who did not receive

treatment or whose treatment was discontinued because they were considered to be at no risk. No less than 175 of these advice cases were among persons attending the Institute at Shillong.

Of the individuals placed under treatment and presumably at risk, 141 absconded before completing the course and there is no record of their eventual fate.

The submission of the six months' 'Health Returns'

was satisfactory.

Vaccine section .- The following quantities of prophylactic vaccines were issued during the year:-

Cholera vaccine

.. 986.5681 c.c.

T. A. B. vaccine

12,309 . .

Influenza vaccine (3) 1,160

The issues of cholera vaccine were more than doubled this year owing chiefly to the cholera epidemic which occurred in Sylhet district. The re-introduction of vaccination into the bacteriophage experimental area of Habiganj resulted, however, in the supply of nearly 2 lacs of doses of cholera vaccine to this subdivision.

Cholera vaccine is prepared at this institute only from authentic and freshly tested strains of cholera vibrio, which conform with the criteria laid down by the Cholera Advisory Committee of the Indian Research

Fund Association.

Bacteriophage section.—The total issues of bacteriophage during 1938 amounted to 495.872 ampoules of 2 c.c. each. An interesting feature is the increased supply to other Governments which was practically doubled as compared with 1937. It would appear that the value of bacteriophage as a therapeutic measure is being increasingly recognized outside Assam.

# Assam Medical Research Society

Owing to limitation of funds, the work of the Society during this, the eighth year since its inception, has been concentrated solely on problems in connection with

The Doom Dooma Cinchons-Plasmoquin Treatment Scheme has been continued for the sixth year. In 1932-33 the spleen and parasite rates of children two Following treatment these indices have been reduced to 16.06 and 12.9 per cent respectively, during the year under review. In 1936, a year of high malaria incidence, the parasite rate rose to 41.0 per cent. Many tea the parasite rate rose to 41.0 per cent. Many tea estates have now adopted this method of treatment as demonstrated by these experiments.

During the year 85.011 anopheline larvæ and 10,932 adults were examined. Anopheline dissections numbered 3,808 A. minimus being the only species found infected.

From the 1st June, 1931, the date the society started work up to the 31st December, 1938, 854,700 anopheline larvæ have been collected and their respective breeding places and dates of collection recorded. During the same period 141,201 adult anophelines have been identified and 55,586 dissected.

Experiments to determine the efficacy of cold weather and pre-monsoon anti-larval control have been continued during the year under review in the four urban and two rural areas, selected for this experiment.

The experiments have shown very encouraging results. The institution of pre-monsoon control has been followed by a significant decrease in the incidence of malaria in the six areas. This is particularly marked, by the heavy reduction in the spleen and parasite rates which has been absented account of the property of the p which has been observed among children two to ten years of age in these areas since this method of control was instituted.

In addition to the six experimental control centres, thirteen other anti-malaria control projects received financial assistance from the Government of Assam, and where a full year's survey had been completed by the society, have been supervised by the society's staff. Similarly, seven tea estates that have adopted the society's recommendations for malaria control following the completion of a full year's survey, have been visited periodically for the purpose of supervision of their control activities.

#### Cholera enquiry under the Indian Research Fund Association

On the recommendation of the Cholera Advisory Committee of the Indian Research Fund Association, a new field enquiry was undertaken during 1938. This was located in the Assam Valley.

From the findings the conclusion may be drawn that inagglutinable vibrios are natural inhabitants of waters and that such vibrios taken in with water, have little chance of survival in the gut of healthy individuals but that in those with an intestinal disturbance, they are more easily to be isolated from stools. Even if the non-fermenting type of vibrios be excluded from these figures, this does not affect the conclusions arrived at.

# The effect of bacteriophage on the agglutinable vibrio

To determine what modifications are brought about in the cholera vibrio by the collective action of a large number of phage types, the stock 12-1 phage resistant cultures and the strain resistant to all the 12 phages kept up at the Pasteur Institute, were examined. They were derived from 653, an Ogawa strain, and have been kept phage resistant to fewer or more phage types as they were discovered, for over 5 years.

It appears from the results that all the cultures with the exception of 12-A, had undergone a definite change to rough and 12-B and 12-M had perhaps changed still further, say to the 'ro' form of Bruce White. In order to see what effect phage has on an agglu-

tinable vibrio when added to water, a flask containing about two litres of water, a little garden earth and a small quantity of stool was autoclaved and was inoculated with 10 c.c. of a 24-hour peptone water culture of a recently isolated with a recently isolated or the same water cold the same water water cold the same water water cold the same water w of therapeutic phage. In two such experiments it was found that an agglutinable vibrio of fermentation type I could be recovered for 7 and 17 days respectively, after which no growth resulted in cultures. The duration of life of the vibrio in the water was cut short by the phage, but it had not undergone any recognizable change.

Two experiments were performed, where a culture of a recent agglutinable vibrio was added to a natural a recent agglithable vibrio was added to a natural collection of water after its salinity had been adjusted, cultures being made daily thereafter for recovering Ag. vibrio. Peptone water enrichment and the modified Wilson-Blair fluid medium were the cultural methods employed. In the latter case about 500 c.c. of the sample was filtered through a Seitz disc and this was washed into 40 c.c. of the medium.

In the first experiment, the water source was a shallow well 3 ft. in diameter with about 3 ft. of

water. The pH was 5.1 and salinity 0.5 parts Cl per 100,000. After adding common salt the salinity had increased to 26 parts, the pH being the same. On adding 100 c.c. of the cholera culture, the vibrio could not be recovered in 24 hours or thereafter. It will be noted that the pH was very low. A rapid diffusion of salt was also noticed. There was no natural vibrio in the water.

In the second experiment, the agglutinable vibrio was added to a tank 32 ft. × 30 ft. The pH of the water varied between 6.3 and 6.7 on different days, the organic matter (Tidy) being 0.12 parts per 100,000.

The salinity was adjusted to 70 parts per 100,000 and a litre of the culture was added to an estimated quantity of 56,000 litres of water in the tank. The agglutinable vibrio was recovered in the 24 hours sample but not thereafter. No growth of any kind resulted in the Wilson-Blair medium throughout and in both experiments.

As this work was done during the last week of October and the middle of November, when low temperatures prevailed, it is not possible to say to what extent this factor contributed to the shortness of the period of viability of the vibrio.

# Correspondence

# EXTERNAL BURSTING OF STRANGULATED HERNIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Most books on surgery describe the result of a strangulated hernia as being either death without operation, life in many cases with operation, or very rarely a fæcal fistula and life, if the strangulation bursts externally. It is however given to very few of us to see any case of the latter type, hence I am sending you details of one that I saw recently.

The patient was an old man in poor health, aged about 50, a cultivator by occupation, who had had a left inguinal hernia for about four years. It had at intervals become obstructed but had always been reduced by himself without undue difficulty or delay. One month before admission the hernia had come down again, but could not be reduced, although it was very painful and he pushed it hard! He had the usual vomiting, intermittent pain, and constipation for six days, except that he sometimes passed a little flatus and stool after deshi purgatives which were regularly administered. It is clear, therefore, that he had an incomplete obstruction.

On the sixth day the vomiting and pain became less

On the sixth day the vomiting and pain became less and on the next day he passed a normal stool, but a moderate-sized lump remained in the groin

moderate-sized lump remained in the groin.

Throughout the illness he had been fomenting the abdomen, but after the condition improved he only applied fomentations to the lump, which six days later, that is 12 days from the onset of the obstruction, burst. The first day the discharge was mostly pus and sloughed intestinal wall, which he described as purana kapra, but after that a fæcal fistula developed.

He was admitted to hospital with the idea that an

He was admitted to hospital with the idea that an operation would be required, but he has made an uninterrupted recovery and his wound has healed without any treatment, so that his only comment has been that he has wasted seven weeks in hospital when he could have been ploughing his field.

Yours, etc., E. W. HAYWARD, Principal Medical Officer, Jodhpur.

RAJPUTANA, 26th March, 1940.

# TAKING BLOOD FOR TRANSFUSION

To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,—I have read with interest the article on 'Taking blood for transfusion' by Lieut.-Colonel S. D. S. Greval, I.M.S., and Dr. S. N. Chandra, in the January issue of the Gazette. As blood transfusion is still in its infancy in India, suggestions for making it easy to perform with safety both to donor and recipient are to be welcomed. I wish to make the following observations:—

1. Complaints regarding incisions on veins may be prevented by laying down, as the London blood transfusion service does, certain conditions,

(a) Only persons with prominent veins must be accepted as blood donors.

(b) The needle method of extraction of blood must be insisted upon and dissection of the vein forbidden.
(c) Donors must be instructed to refuse to serve

if dissection is attempted.

(d) The transfusion must be performed by a skilled surgeon and not by inexperienced house surgeons.

(e) The site of the venipuncture must be infiltrated with a local anæsthetic such as 2 per cent novocain or novutox. The insertion even of a large bore needle is then painless.

2. The application of the sphygmomanometer cuff to the donor's arm has now rightly become an almost standard method of making the veins prominent. The cuff is inflated to a pressure of 67 to 70 mm, when the veins are rendered prominent without any arterial constriction. Further, the pressure is regulated more easily and with less disturbance than with an ordinary tourniquet.

tourniquet.

3. The closed system for collection of blood is to be preferred as it is more aseptic and avoids mess. But I have not found negative pressure necessary for withdrawing blood. The authors recommend a 20 c.m. record syringe needle to save the donor the pain caused by a large needle. The rate of blood flow through the smaller needle is necessarily slow and to improve it negative pressure is advocated. This, in my opinion, is a complication in technique. Blood transfusion is generally an emergency operation and medical men must be capable of doing it with the minimum equipment. The simplest is the best. The more complicated the apparatus the more the assistance needed.

4. The closed system described by the authors does not appear to be strictly a closed one because the 'negative pressure in the bottle is abolished by admitting air slowly through the knotted tube (hissing sound is avoided). That is, unfiltered air is slowly let in. It is highly desirable to filter the air admitted into the bottle and this can be easily achieved by the inclusion at intervals on the rubber tube leading to the exhaust pump of three glass filters stuffed with cotton-wool. Mere knotting of the rubber tube may prevent to rapid an inrush of air, but it is doubtful if it can be depended upon to prevent contamination of the contents of the bottle either at the time of creation or of abolition of the pregative pressure.

of the bottle either at the time of cream abolition of the negative pressure.

5. I have used sodium citrate solution in a concentration of 0.25 per cent with blood but found that fine clots tended to form and these had to be that fine clots tended to form and these had to be filtered out. Sodium citrate solution in a 0.35 per cent filtered out. Sodium citrate solution in a 0.35 per cent final strength is now universally used and it is also final strength is now universally used and it is recommended by the Medical Research Council transfusion of blood with this slightly higher citrate content is not attended with any more reactions.

Yours, etc.,

K. S. RANGANATHAN,

M.R.C.S., L.R.C.F.

THE KING INSTITUTE OF PREVENTIVE MEDICINE, GUINDY, MADRAS, 19th March, 1940,



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# OBSERVATIONS ON THE USE OF NICOTINIC ACID IN THE TREATMENT OF PELLAGRA AND ALLIED CONDITIONS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Captain J. W. D. Goodall, in his article 'Observations on the use of nicotinic acid in the treat-'Observations on the use of incotinic acid in the treatment of pellagra and allied conditions', which appeared in your March number, makes the statement that 'pellagra is quite common in Bengal'. He does not, however, offer any figures in support of this conclusion, and in his article he describes only three not very typical cases.

In my experience, classical pellagra, characterized by symmetrical dermatitis, lesions of the alimentary tract and mental changes, is a rare and relatively unimportant disease in India. I have visited many medical wards in search of cases and made enquiries from physicians in most parts of the country. Except for some mild cases in Vizagapatam and one or two more serious cases in maize-eating districts in the north of the Punjab, I have never observed classical pellagra, while the physicians consulted have nearly all declared that the disease is unknown. Pellagra is not a difficult condition to recognize. Some years ago I had the opportunity of studying pellagra in a maizehad the opportunity of studying penagra in a maize-eating district in Roumania. In some villages in the district about 5 per cent of the population developed pellagra every spring. The hospitals and mental asylums were full of serious cases and there was a high mortality. In this case the adjective 'common' might legitimately be used. In India, on the other

hand, pellagra never assumes epidemic proportions and is not a serious public health problem.

While it has been clearly shown that nicotinic acid

is effective in the treatment of pellagra, the question of ætiology has not yet been fully cleared up. One fact which requires explanation is the frequency of pellagra in maize-eaters and its rarity in rice-eaters. We have recently shown \* that the nicotinic-acid intake of poor rice-eaters may actually be below that of poor maize-eaters so that the ætiology and distribution of pellagra cannot be satisfactorily explained in terms of nicotinic-acid deficiency

Statements that pellagra is 'common' among riceeaters tend to confuse the issue. On the other hand, any reasonably accurate data about the incidence of pellagra in India is of value. Hospital statistics are notoriously fallacious, but percentage admission rates to hospitals drawing patients from an unselected sample of the general population may provide some informa-tion about the incidence of any particular disease.

> Yours, etc., W. R. AYKROYD, Director, Nutrition Research Laboratories, I. R. F. A.

Coonoor, 6th April, 1940.

\* Aykroyd, W. R., and Swaminathan, M. (1940). Indian Journ. Med. Res., 27, p. 667.

# Service Notes

#### APPOINTMENTS AND TRANSFERS

Colonel A. C. Munro, v.H.s., is appointed Honorary Physician to The King, 22nd October, 1939, vice Colonel D. C. V. FitzGerald, M.c., retired.

The services of Colonel D. H. Rai, M.c., v.H.s., are replaced at the disposal of the Government of the Central Provinces and Berar, with effect from the 11th March, 1940 (formagn). March, 1940 (forenoon)

Lieutenant-Colonel M. P. Atkinson, an Agency Surgeon, is appointed as an Additional Medical Officer, Indore, with effect from the afternoon of the 10th February, 1940.

Lieutenant-Colonel M. M. Cruickshank, Super-intendent, Government General Hospital, Professor of Surgery, Medical College, and Specialist (Senior) in Surgery, Madras, is appointed Chief Medical Officer, Delhi with offset from the afternoon of the 9th March Delhi, with effect from the afternoon of the 9th March,

Lieutenant-Colonel R. F. D. MacGregor, C.I., an Agency Surgeon, is appointed as an Additional Medical Officer at the Irwin Hospital, New Delhi, with effect from the 10th March, 1940.

On return from leave Lieutenant-Colonel W. R. Ross-Stewart, c.i.e., resumed charge of the office of Civil Superson of the 16th Civil Surgeon, Lahore, on the afternoon of the 16th March, 1940.

Major J. C. Drummond is confirmed in the post of Surgeon-Superintendent, Presidency General Hospital, Calcutta, with effect from the 18th May, 1939.

Major A. E. Kingston relinquished charge of his special duty at the Dufferin Hospital, Rangoon, on the afternoon of 9th March, 1940, and assumed charge of the duties of the Civil Surgeon, Magwe, on the forenoon of the 19th March, 1940. of the 13th March, 1940.

Major A. N. Duggal to be D. A. D. P., Lahore District. Dated 21st February, 1940.

Major A. N. Chopra, Superintendent, Central Jail, Jubbulpore, is appointed temporarily as Additional Assistant Director-General, Indian Medical Service, with effect for the control of the 20th March, 1940. with effect from the forenoon of the 20th March, 1940.

Major H. S. Smithwick has been appointed Civil Surgeon, Belgaum, with effect from 5th April, 1940, vice Lieutenant-Colonel B. Z. Shah, retired.

Major F. H. Whyte is appointed to the post of Civil Surgeon, Simla West, with effect from the forenoon of the 22nd April 1940.

the 22nd April, 1940.

Transfers to Civil employment

Captain W. H. G. Reed. Dated 1st February, 1940. Major A. K. M. Khan. Dated 22nd February, 1940. Captain W. W. Laughland. Dated 24th February, 1940.

Captain T. C. McD. Morrison. Dated 27th February, 1940

Captain E. H. Lossing made over charge of the Hooghly Jail to Lieutenant-Colonel H. E. Murray, on the afternoon of the 12th February, 1940.

Captain J. A. M. Cameron to be Specialist in Surgery, Karachi. Dated 22nd February, 1940.

On relief of his duties in the Military Department, Captain T. M. Williams has been posted on general duty at the Bai Motibai and Sir D. M. Petit Hospitals, Bombay, with effect from the foreneon of 18th Morse. Bombay, with effect from the forenoon of 10th March,

On relief of his duties in the Military Department, Captain T. C. McD. Morrison has been posted as Civil Surgeon, Sholapur, with effect from the 28th March, 1940, vice Major H. S. Smithwick transferred.

To be Captain (on probation)

Shri Rameshwar. Dated 5th March, 1940, with seniority from 5th March, 1936.

On relief of his duties in the Military Department. Captain W. W. Laughland has been placed on general duty at the Central Mental Hospital, Yerayda, with

effect from the forenoon of 29th February, 1940.
On transfer from Jhelum Captain C. F. Garfit assumed charge of the office of Civil Surgeon, Murree,

on the 1st April, 1940.

On transfer from Ambala Captain D. W. Taylor assumed charge of the office of Civil Surgeon, Dalhousie, on the 1st April, 1940.

To be Lieutenants (on probation) Dated 1st February, 1940

Lakshman Nandkeolyar. Brij Lal Kapoor.

LEAVE

Major R. A. Wesson, Civil Surgeon, Gorakhpur, on 4 months' leave ex-India from 26th March, 1940, with permission to prefix Easter and Holi holidays.

Captain E. H. Lossing, Civil Surgeon, Hooghly, is granted leave on average pay for 3 months in India, with effect from the date on which he was relieved.

#### PROMOTION

Lieutenant-Colonels to be Colonels

R. V. Martin, C.I.E. Dated 11th November, 1939, with seniority from 26th January, 1936.
A. C. L. O'S. Bilderbeck. Dated 24th November, 1939, with seniority from 31st July, 1936.

Brevet-Colonel to be Colonel

J. W. Vanreenen, o.B.E. Dated 29th January, 1940, with seniority from 31st July, 1936.

The following I. M. S. Officers have been advanced to the higher position of their rank, that is to the list of Lieutenant-Colonels selected for increased pay for ability and merit, with effect from the dates noted against them

Lieutenant-Colonel .M. L. Treston. Dated October, 1939.

Lieutenant-Colonel C. de C. Martin. Dated 8th November, 1939.

Lieutenant to be Captain

A. N. Roy. Dated 20th March, 1940.

#### RETIREMENTS

Lieutenant-Colonel B. Z. Shah. Dated 5th April, 1940. Captain H. L. Khosla. Dated 11th February, 1940.

# Notes

### STIBOPHEN

BURROUGHS WELLCOME AND COMPANY, to meet the demand for the English product, announce the manufacture and issue of Stibophen by licence under the Patents, etc., Emergency Act, 1939, relative to the English Patent No. 376346, the objective substance of which is Fouadin (Stibophen).

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THE TREATMENT OF SYPHILIS

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however, have been made where recent experience has shown them to be desirable, so that the medical practitioner using N.A.B.—novarsenobillon—may have

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toxicity and the rapidity with which it is excreted by the kidneys ensures complete safety in use. Previous to the outbreak of war the drug was not produced in Great Britain. In the form of uropac, supplies of it are now available to meet immediate demands. A specimen of the uropac booklet has been sent to us by Messrs. Pharmaceutical Specialities (May and Baker), Limited, Dagenham, England. We understand that a copy will be forwarded to any member of the medical profession on request to:—Messrs. May and Baker (India), Limited, 11, Clive Street, Calcutta, India. India.

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REPORT ON TWENTY-FOUR CASES OF TROPICAL MACROCYTIC ANÆMIA IN PUNJABI MEN

By GEOFFREY F. TAYLOR, M.A., M.R.C.P. (Lond.)
MAJOR, I.M.S.

Professor of Clinical Medicine, King Edward Medical College, Lahore

and

S. S. MANCHANDA, M.B., B.S.

'House Physician, West Medical Ward, Mayo Hospital, Lahore

TROPICAL macrocytic anamia is fairly common in the Punjab. This report is based on twenty-four cases investigated in the West Medical Ward of Mayo Hospital, Lahore, during the last six months. The cases have many points in common with those reported by Wills, Napier and Hamilton Fairley.

# **Ætiology**

1. Poverty and diet.—The cases occurred in men of the poorest class between the ages of 25 and 60 years, whose diet was of very low quality lacking proteins, fat and vitamins. It consisted mostly of whole wheat chapati and pulses (dâl). Occasionally a little milk, meat and fresh vegetables and fruits were eaten by some of the men and in some, rice was eaten instead of chapatis. It was not possible to investigate the diet more fully as the cases were not investigated in their own homes, and the individual items of their diet could not be weighed. The same type of anæmia is common in Punjabi women of this class, and we propose to report on this pregnancy macrocytic anæmia at a later date.

2. Ankylostomiasis.—In twenty cases ova of ankylostoma were present. A count of the number of ova was not done, but the infection in some cases was severe and in others mild, as judged by the number of ova present on microscopical examination of the stools. We are investigating by egg counts the severity of ankylostomiasis infection of cases now admitted into the wards.

3. Malaria.—In twelve there was an enlargement of the spleen which was attributed to malaria. In fifteen of them there was a history of malarial fever.

4. Diarrhæa.—Diarrhæa was a prominent symptom in twelve cases and in four of these there was a history of blood and mucus in the stools. The stools were sprue-like in character in three.

5. Syphilis.—The Wassermann reaction was positive in two cases.

We conclude that the chief ætiological factor is a poor diet, in which there is a deficiency of either Castle's extrinsic factor, or of some other independent hæmopoietic principle, as suggested

by Napier. We will discuss the evidence for this independent principle later. The contributing factors are a loss of blood by ankylostomiasis infection and destruction of blood by malaria. Lack of absorption of the blood-forming substances caused by diarrhea was a factor in half of our cases. Obviously the first and last factors are the important ones, namely, poor diet and diarrhea, as ankylostomiasis and malaria do not cause macrocytic anæmia by themselves.

# Clinical findings

1. Blood picture.—There was a macrocytic anæmia in all our cases. The lowest blood count showed 690,000 red cells per c.mm., while five had red cell counts below one million and eleven others had red cell counts between one and two million. The lowest hæmoglobin reading was 2.22 grammes (12.8 percentage of Sahli's scale) while ten cases had hæmoglobin less than 2.94 grammes (17 per cent Sahli's scale) and twelve others had hæmoglobin between 2.94 and 5.88 grammes (17 to 34 per cent Sahli's scale).

The highest colour index was 1.6. The highest reading on Eve's halometer was 8.4 $\mu$ . The estimation of average cell volume was not done. In ten of the cases the white cell count was under 5,000, the lowest being 3,125 per c.mm. Anisocytosis and poikilocytosis of a severe degree was noted in some. The highest reticulocyte count on admission was 3.5 per cent.

2. Van den Bergh reaction.—In seventeen cases the van den Bergh indirect reaction was positive and in the remaining ones it was negative. The highest icteric index was 5.8, which is within normal limits, showing that there was no severe hæmolysis.

3. Gastric test meal.—There was complete achlorhydria after a porridge meal in two of the cases but only one of these was without hydrochloric acid after histamine injection. The others showed varying quantities of hydrochloric acid.

4. Estimation of vitamin C.—This was done in some cases but we are unable to come to any definite conclusion as yet.

5. Sternal puncture.—Sternal puncture was done in nineteen cases. In eleven of these the normoblasts were above the normal 25 per cent for Indians (Napier and Sen Gupta, 1938). The highest figure recorded was 55.6 per cent.

In eight cases the megaloblasts were above the normal 1.5 per cent, the highest reading being 12 per cent. The other counts in these eight cases were—2.5, 2.5, 3.0, 3.0, 3.5, 5.0, 7.0 and 12.0 per cent.

They all showed the ordinary signs of severe anemia, such as pallor and breathlessness. There was a varying degree of ædema in thirteen of them. Eight cases gave a history of soreness of the tongue. There was evidence of glossitis in seven and in the others the tongue was normal. There was severe pyorrhæa in eight cases.

There were no other prominent symptoms and none had very abnormal pigmentation of the skin. There were no signs of involvement of the nervous system.

# Post-mortem findings

One only of these men died and we were fortunate to obtain permission to perform a post-mortem examination. The patient was a man of 60 years of age, who was admitted into the hospital in September 1939, with the complaint of weakness, and pain in the abdomen and chest. He had the usual appearance of a patient with severe anemia. The red cell count on admission was 1,000,000 per c.mm., and the hæmoglobin was 32 grammes per cent (19 per cent Sahli's scale). The average size of the red cells recorded by Eve's halometer was 8µ. The van den Bergh reaction was negative, and there was no urobilin in the urine. Gastric analysis showed a normal curve after a porridge meal. Sternal puncture gave the following results:—

	Neutro- phils	Eosino- phils	Basophils	
Polymorphonuclears Metamyelocytes Myelocytes Premyelocytes Myeloblasts Lymphocytes Monocytes Normoblasts Erythroblasts Megaloblasts Ratio of A to B 5 : 1	15.0 44.0 15.0 8.5  1.0  12.0 3.5 0.5	0.5	··· }	А.

Hookworm ova were present in the stools in large numbers. He was in the wards for 10½ weeks and was treated by liver injections (Exatrope injections 2 c.cm., on alternate days) and yeast extract by the mouth. The ankylostomiasis was treated by carbon tetrachloride and oil of chenopodium. The blood picture and general condition improved only slowly and rose to 1,560,000 red cells per c.mm., and 4.84 grammes of hæmoglobin (28 per cent Sahli), the colour index being 1.14 and the average size of red cells 7.7 \( \mu, \) which is slightly macrocytic. He died suddenly while sitting up in bed, presumably from sudden myocardial failure. The post-mortem examination showed some free fluid in the abdomen and a recent ulcer two inches from the pylorus in the duodenum. The bone marrow was yellow-grey in colour, soft and fatty in consistency, both in the shafts and ends of the bones. The bone marrow was thus aplastic as judged by naked-eye appearance. Unfortunately sections of it were not prepared.

This case is of interest because it shows that the lack of response to treatment is associated with and is probably caused by aplasia of the bone marrow. Except for the lack of response to treatment there appears to be no method of judging the aplastic condition of the marrow. In this case the sternal puncture readings were within normal limits, and we cannot see how examination of sternal puncture material will help in diagnosing this aplasia. Possibly the absence of a normoblastic or megaloblastic reaction in the bone marrow may indicate an aplastic state, but this is not confirmed by findings in other cases noted below.

It is also of interest in showing a slightly macrocytic blood picture and aplasia of the marrow.

# Response to treatment

Owing to the severity of the condition of many of the cases we treated them by both marmite and yeast extract by the mouth and by liver injections. Because of the war, purified concentrated liver extracts could not be obtained and Exatrope (Glaxo) and Erythgen (Carnrick) were used. Blood transfusion was done in two cases only. We did not employ it more frequently because during the last few years there have been several deaths following blood transfusion in cases with severe anæmia in this hospital. We are now using small transfusions, repeated frequently, of not more than 200 c.cm. at a time.

Owing to the severe condition of many of these cases we did not feel justified in with holding liver injections in order to enable us to note the response to marmite alone. Most of the cases of ankylostomiasis were treated at once with carbon tetrachloride and oil of chenopodium and we noted no toxic effects of these drugs. Thymol did not appear to be as efficient. All cases were put on the hospital diet consisting of milk, chapati, meat, fresh fruit and vegetables when they were able to eat it.

The highest reticulocytosis noted after treat-

ment had begun was 25 per cent.

Seven of the cases improved only slowly with treatment. Eleven others improved rapidly within a few weeks, while five left the hospital against our advice before treatment had been

The sternal puncture findings of the cases which improved slowly, were normal in three, but two showed a normoblastic reaction with normoblasts up to 55.6 per cent and 37.6 per cent, and one other case showed 2.5 per cent megaloblasts which is slightly above the normal limit of 1.5 per cent. We suggest that the bone marrow of these cases was in a partially aplastic condition because of their lack of response to treatment.

In seven of the cases the average size of the red cell and the colour index remained above normal after more than one month's treatment. In two of these cases the anæmia was macrocytic after two and three months respectively. We do not understand the reason for this, as both had intensive treatment by liver injections, marmite by the mouth, and blood transfusion.

#### Discussion

The findings in these cases appear to be similar to those of macrocytic tropical anæmia reported in other parts of the world. The blood picture puncture findings have been and sternal examined in order to try to find some differences between the findings of tropical macrocytic anæmia and these for the findings of tropical macrocytic anæmia and these for the findings of tropical macrocytic anæmia and these for the findings of the finding anæmia and those of Addison's pernicious anæmia. There appears to be no difference in the blood and of the blood an the blood and sternal puncture material except that it is said the trial puncture material except that it is said that hæmoglobinized megaloblasts occur in Addison's occur in Addison's anemia only. We have not seen any of these seen any of these cells in the sternal puncture material of these material of these cases. But apart from this we can find no different apart apart from the sternal pulleting t we can find no difference. In both conditions the anamia may be the anamia may be very severe, a high degree of macrocytosis and markets and may be macrocytosis and nucleated red cells may

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litions gree of be Table of sternal puncture count on admission

		LYMORP		і Мел	AMYEL	OCYTES	M	YELOCY	TES					T		
Case number	Neutrophil	Eosinophil	Basophil	Neutrophil	Eosinophil	Basophil	Neutrophil	Eosinophil	Basophil	Premyelocyte	Myeloblast	Lymphocyte	Monocyte	Normoblast	Erythroblast	Megaloblast
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	15.0 7.6 5.0 9.0 10.5 5.1 17.0 6.0  25.0 17.0 12.0  27.0 11.0 15.7 27.0 11.0 16.7 25.0 16.0	0.3 1.5 1.5 0.2 0.4   0.6  3.0  0.7  0.5 1.5	0.3	44.0 18.3 32.0 26.0 15.0 39.2 37.6 47.5  30.0 30.0 39.0  13.0 21.5 27.0 20.0 25.5 37.5 25.0	0.5 1.0  0.5  2.0 1.4  1.0  2.5 0.3 	0.6	15.0 8.0 6.5 14.0 18.0 12.3 9.3 22.5  7.0 17.9 12.0  14.6 32.0 15.0 25.3 10.0 19.0 9.0	0.5  0.8  0.2  0.7		8.5 0.3 7.0 23.0 3.0 6.0 0.4 0.5  0.5 8.0 0.4  6.5 14.5 1.5	0.6	1.0 9.0 1.0 1.0 2.0 0.5  2.0 2.0 2.0  3.0 1.5 2.0 5.6 2.0	1.0	12.0 55.6 37.6 15.6 27.0 12.5 31.6 21.0  24.4 25.0 20.4 25.0 37.0 19.5 20.0 27.0 32.5 33.0	5.3 8.3 7.9 9.0 15.0 2.4 0.5  8.0 3.5	0.5 0.3 1.0 2.5 12.0 0.4  3.5 1.2 3.0  0.6 3.0 1.5 1.5 5.0 0.0 2.5

Table of blood findings on admission

Serial number	R. B. C.	W. B. C.	Hb. in grammes, per cent	Diameter of red cell in μ	van den Bergh	Icteric index	Reticulo- cyte count, per cent	Colour
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	1,000,000 1,760,000 1,200,000 790,000 1,820,000 770,000 2,320,000 2,430,000 690,000 2,070,000 1,700,000 2,420,000 1,170,000 2,200,000 2,200,000 1,250,000 1,160,000	8,125 4,260 4,200 4,800 4,600 3,225 6,250 6,250 5,600 5,000 5,625 8,200 3,750 4,100 3,125 4,960 7,400 4,375	3.04 7.26 5.2 2.7 6.9 4.15 10.3 9.3 12.9 3.6 7.2 6.05 10.4 5.1 4.3 8.6 10.3 5.1 4.3	8.0 7.9 7.8 8.4 7.8 8.2 8.1 8.19 8.2 8.1 7.8 7.8 7.8 7.8 7.8 7.8 7.8	Negative Indirect + Do.	4.0 4.0 5.3 4.8 5.0 2.3 3.5 3.0 3.5 2.0 4.0  3.5 2.2 2.1	1.0 1.0 3.0 2.5 2.0 3.0  3.5  2.5 7.5 (3 weeks after	1.1 1.3 1.25 1.2 1.3 1.5 1.3 1.1 1.1 1.6 1.06 1.1 1.5 1.4 1.1 1.25 1.03 1.2 1.1
20 21 22 23 24	1,200,000 1,660,000 1,280,000 860,000 1,700,000	3,775 4,235 5,000 6,875 4,750	6.9 6.9 6.9 4.1 6.05	8.19 8.0 8.2 8.0 7.9	Do. Do. Negative Indirect +	5.0 5.0 5.0	admission). 1.5 2.5 0.66	1.6 1.25 1.4 1.25 1.02

found in the peripheral blood, anisocytosis and poikilocytosis may be marked. The sternal puncture material may show a megaloblastic or normoblastic reaction or it may be normal. Blood destruction, as judged by the van den

Bergh reaction and icteric index, may be more severe in Addison's anæmia.

If Castle's theory of the extrinsic and intrinsic factors forming a hamopoietic principle be (Continued at foot of next page)

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# OBSERVATIONS ON GASTRIC ACIDITY IN ANÆMIA

By G. R. McROBERT, M.D. LIEUTENANT-COLONEL, I.M.S. D. GOVINDA REDDY, M.D.

and

R. SUBRAMANIAM, M.B., B.S. General Hospital, Madras

This note is based on 100 cases of anæmia admitted to the male wards of one of the medical units of the Madras General Hospital during the past two years. With a large number of acute cases demanding admission, necessitating frequent turnover of patients, it was not possible to retain most patients for any length of time, nor in rush periods, as in the typhoid season, could full investigations be carried out.

The report includes only those cases of anæmia

in which no other illness could be found.

Fractional test meals were carried out in all cases at least once, the oatmeal gruel being administered in the usual manner after the removal of the resting juice in the early morning.

In 39 cases achlorhydria was found. In 34 of these one milligram of histamine hydrochloride was given subcutaneously and in 20 cases the fractional test meals were repeated on several occasions.

The classification, age distribution, test meal analysis, and the effect of treatment in these cases are shown in the following tables.

### (Continued from previous page)

correct, we should expect the anæmia resulting from the absence of either factor to be of the same type. If Napier's idea of an additional external hæmopoietic factor be correct, the findings in the two conditions might be different. Until the various factors are chemically identified it is difficult to come to a final conclusion, but the evidence for any difference of the blood picture in the two conditions is slender.

We wish to thank the representatives of Glaxo and G. W. Carnrick Co. for supplying liver preparations in some cases free of charge.

#### Summary

1. Tropical macrocytic anæmia in twentyfour Punjabi men is described, with details of the blood picture, including sternal puncture findings.

2. Details of one post-mortem examination

are given.

3. The blood findings and sternal puncture picture appear to be the same as Addisonian pernicious anæmia, except for the possible presence of hæmoglobinized megaloblasts in the sternal puncture material of the latter.

#### REFERENCE

Napier, L. E., and Sen Gupta, P. C. (1938). Indian Med. Gaz., Vol. LXXIII, p. 1.

Twenty cases, with achlorhydria on admission, were reinvestigated at the time of discharge.

#### TABLE I

Classification of cases in whom test meals were done

			0.00		
(a) (b) (c)	Ancylostome Macrocytic a Microcytic, anæmia, oth	næmia hypochro	Number 77 7 7 7 16 (a) 16 100	er Ach	$ \begin{array}{c} \text{lorhydria} \\ 27 \\ 6 \\ \hline 6 \\ \hline 39 \end{array} $
		TABLE	II		
	Age	incidence	e in year	's	
	1-10 11-20 21-30 31-40 41-50 51-60	Table			2 26 41 19 7 5 100
	Analysis	s of test	meal re	ports	
	Normochlorhy Hypochlorhyd Hyperchlorhyd	ria			40 17 4
	Achlorhydria				39

Two cases (one ancylostome microcytic and one macrocytic) with histamine-fast achlorhydria on admission were discharged secreting free hydrochloric acid in the gastric juice.

S., Hindu, male, aged 16, admitted on 24th March, 1938, and discharged on 24th June, 1938. Initial blood count on 1st April: red blood cells 1,180,000 and hæmoglobin 16 per cent, volume index 0.65. Ancylostome ova present in the fæces. Achlorhydria which was histamine-fast. Treated with ferri et ammon. citras, 90 grains a day.

A CONTRACTOR OF THE PARTY OF TH			
Date	Red blood cells	Hæmo- globin, per cent	Fractional test meal
26-3-38 29-3-38 1-4-38 6-4-38 14-4-38 3-5-38	1.18 1.62 2.34 3.3	16 27 41	Achlorhydria. No histamine response.
8-5-38 13-5-38	4.05	63	Free acid after histamine. Free acid in resting juice.

Six cases (all ancylostome anæmia) histamine fast on admission produced hydrochloric acid with histamine before discharge.

In a number of cases of ancylostome anemia with under 1,000,000 red blood cells per c.mm. the hydrochloric acid content of the gastric juice increased as the hæmoglobin of the blood but in other similar cases the hydrochloric acid

June, 1940]

Table IV
Results of treatment of cases with achlorhydria

			AT TIME OF DISCHARGE			
Type of anæmia	Number of cases	On admission result of histamine injections	Free	No free		
			Sine histamine	Cum histamine	acid	
(a) Ancylostome	11 4 5	No free acid 7 Free acid 4 No free acid 2 Free acid 2 No free acid 4 Free acid 1	1 2 1 1 0 1	3 2 0 1 0 0	3 0 1 0 4 0	
Total	20	No free acid 13 { Free acid 7 }	6	6	8	

curve was normal from the beginning, despite profound anæmia.

The examples below show that cases which commenced and remained achlorhydric and histamine-fast responded to treatment with iron just as rapidly as those with free hydrochloric acid in abundance.

	Achtor	HYDRIA	Normochlorhydria		
Date	Tham	biah	Kannan		
	Red blood cells in millions	Hæmo- globin, per cent	Red blood cells in millions	Hæmo- globin, per cent	
3-5-39 11-5-39 14-5-39 21-5-39 24-5-39 27-5-39 3-6-39 10-6-39 14-6-39 21-6-39 24-6-39 24-6-39 24-6-39 25-6-39 1-7-39	0.87 1.5 2.13 3.0 3.0 3.0 3.0 3.2 3.58 4.16 4.32 4.35 5.0 5.0 5.0 5.5 5.22 5.5	12 20 32 55 55 55 57 61 75 81 87 97 97 105 105 109	1.24 1.38 2.16 2.6 2.7 2.76 2.81 2.86 3.35 3.4 3.6 3.7 4.16 4.2 4.32 4.72 5.0	19 20 42 42 49 51 62 68 73 75 82 85 90 90 100 100	

The series includes 4 cases of typical Witts' anemia with severe koilonychia, no ancylostomiasis and histamine-fast achlorhydria. All responded well to iron.

The macrocytic anemias all responded to marmite and 6 out of 7 were achlorhydric on admission in contradistinction to macrocytic anemias which have been described in other parts of India with normal hydrochloric acid secretion.

A further series will be reported in more detail as opportunity presents but it is obvious that:—

- (a) histamine-fast achlorhydria is a condition from which recovery may be made,
- (b) the condition is not uncommonly found with microcytic ancylostome anæmia,
- (c) high-dosage therapy with iron can be carried out efficiently in the absence of hydrochloric acid.

Our thanks are due to Professor Mannady Nayar and the staff of the Biochemistry Department of the Madras College for fractional-test-meal reports.

# ABNORMALITIES OF THE SUPRARENAL GLAND AND ADDISON'S DISEASE

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The study of the adrenal glands presents features which are of more than ordinary interest. The peculiar composition of the organ, consisting of two parts, which are entirely different embryologically, and moreover, the uncertain and incomplete knowledge of its functional activities claim continued study. Whatever little knowledge we possess on this subject is derived from pathological observations rather than from physiological experiments (Boyd, 1938). In view of the above facts we are recording a few abnormalities of the

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emia nm. juice rose, acid adrenals that we have observed in the study of about two thousand autopsies from the year 1919 to March 1940. The following table shows the results of our investigation:—

TABLE

Total number of autop- sies studied	Total number of supra- renal abnor- malities	Nature of abnormalities in the gland	Total number of cases showing exten- sive tuber- culous lesions in the body
2,007	16	(a) Tuberculosis 2 (b) Tumour—	352

From the above number the following seven cases are described in detail in consideration of the rare and interesting nature of the lesions.

Case 1.—M. B., female, aged 30, was admitted into the hospital on 9th August, 1938, in the following condition—

The patient complained of intense epigastric pain which was of about four months' duration. On examination pulse rate was found to be 170 per minute with very feeble volume. There was rigidity and tenderness of the abdomen especially over the pelvic region. A hard and tender mass was felt in the right iliac fossa. She died within a few hours of admission and an autopsy examination, which was done the next day, showed the following:—

A pint of blood-stained purulent fluid in the peritoneal cavity. Omentum was extensively adherent to the pelvic organs; tubo-ovarian masses were seen on both sides with extensive adhesions and fibrinous deposits. These masses, when cut, showed frank pus which yielded B. coli on culture. A tumour mass was seen above the left kidney. The other regions showed no marked change. Opinion as to the cause of death was peritonitis following ruptured suppurative tubo-ovarian mass. The tumour in the kidney region was found to arise from the left suprarenal gland, and it was globular in shape and pinkish in colour, somewhat cystic in feel and it measured 12½ by 6 inches. The tumour completely replaced the adrenal tissue of which a strip of cortical portion could be seen at the periphery of the tumour. On cutting through the mass the tumour was found to consist of partly solid and partly soft tissues which were of different colour at different places—red, hæmorrhagic, pale, brown and dirty greenish black (plate VI, figure 1). There was surrounded by a fibrous capsule which separated the new growth from the scanty remnant of the cortical portion of the adrenal gland.

Microscopical anatomy of the tumour—(hæmatoxylin-

Microscopical anatomy of the tumour—(hæmatoxylineosin stain and Mallory's phosphotungstic acid stain)—the growth consisted mainly of compact masses of large ganglionic cells with very little intercellular substance

(plate VII, figure 2). Nerve fibres and intercellular neuro-fibrils were scanty. On higher magnification (plate VII, figure 3) the ganglionic cells were well seen; the nuclei were usually seen to be placed at the periphery and binucleated cells were also present. The nucleoli were distinct. Most of the cells showed definite vacuolations in their cytoplasm giving a foamy appearance; evidently this is a degenerative process which has set in within the tumour. No other abnormal finding in any other region. Right suprarenal gland was normal.

Commentary.—The structure of the tumour was of a ganglion neuroma. Tumours arising from the sympathetic nervous system are not common (Geschickter, 1935) and in the reported cases the tumours had their origin in the central nervous system, cranial nerves and their roots and ganglions, neck, thorax, alimentary tract, suprarenals, retroperitoneal region, pelvis and the peripheral nerves. Ganglion neuromas from the suprarenals are still rarer. McFarland (1931) collected about one hundred cases of this type of new growth of which only thirteen had their source in the adrenal gland. These tumours usually run a benign course although rarely they may take a malignant turn. Extensive destruction of the adrenal substance by neoplasm may give rise to Addison's disease syndrome. In Guttman's (1930) series of 566 cases of Addison's disease only 1.2 per cent was due to a neoplastic condition of the suprarenal. In this case there was practically no suprarenal substance left excepting a small strip of cortex, which was for practical purposes devoid of any function. Though the destruction was extensive there were no symptoms of suprarenal failure, probably because the right suprarenal was healthy but it showed no compensatory hypertrophy.

Case 2.—J. H., male, aged 51, admitted into the hospital on 2nd August, 1939, with the following complaints:—

- (1) Generalized weakness and lassitude, progressive anæmia and loss of weight.
- (2) Vomiting after meals—duration four months.

  (3) Pain during swallowing behind the sternum and in the epigastrium, left lumbar and left iliac regions.

History.—About a year prior to his admission, the patient was suffering from 'acidity' and he felt he was getting weaker. About eight months back he felt difficulty in swallowing but took no notice of it. Since four months he started bringing up all food immediately after eating and about that time he began to occasional painful sensations in the left iliac region and chest.

Condition on admission.—Poorly nourished, moderately built, looked markedly anæmic. There was no jaundice and the temperature was normal; P/R = 80/20; blood pressure—systolic 115, diastolic 70.

# EXPLANATION OF PLATE VI

Fig. 1. Case 1.—Exact size of tumour (cut surface). Note the different colours at different areas and a gmall rim of suprarenal structure at the periphery.

Fig. 6. Case 3.—Both suprarenals showing the hamorrhagic appearances of the organs. The pale areas are composed of degenerated glandular elements.

Fig. 11. Case 6.—Suprarenal glands showing the appearance; both the glands have been partially cut open to show yellowish-grey nature of the necrotic change.

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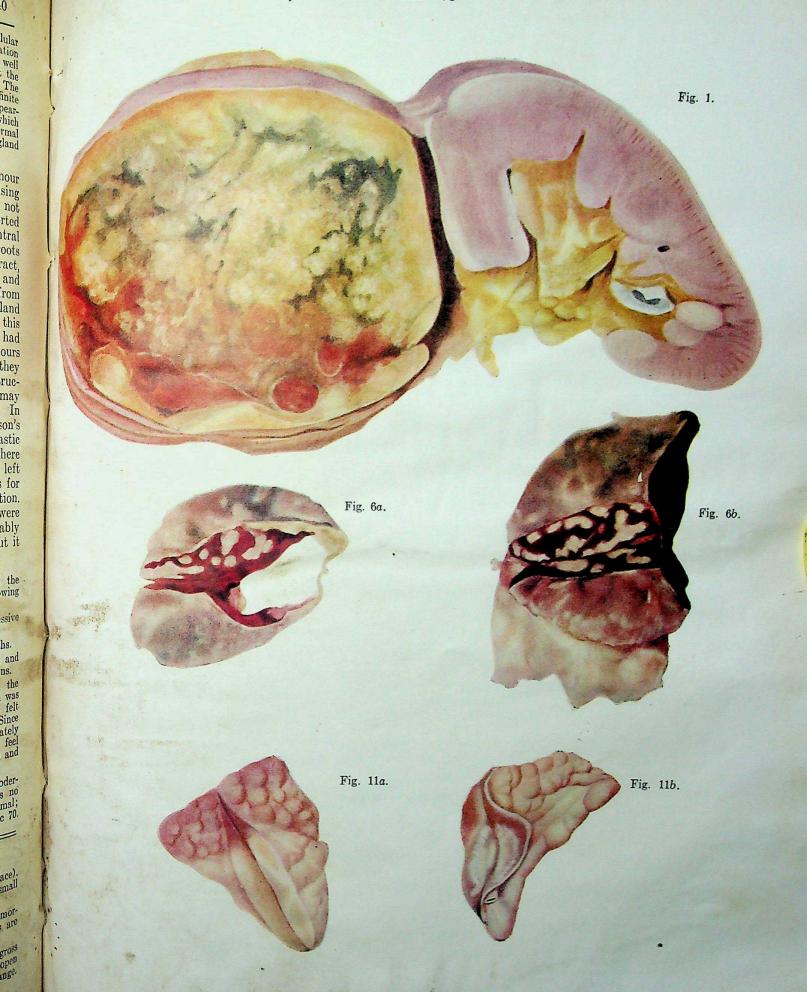
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After admission.—X-ray examination showed a new growth of the cardiac end of the stomach. A laparotomy was performed and a huge hard growth with uneven surface was found occupying the fundus and the of the stomach.

uneven surface was found occupying the fundus and body of the stomach.

The patient died on 7th September, 1939, and a partial post-mortem was done to explore the abdominal cavity. Besides the gastric growth, a number of huge masses were seen within the peritoneal cavity. These were removed and on examination showed extensive neoplastic involvement of the stomach. A mass 3 by 3½ inches was seen at the hilum of the right kidney but separate from it; another mass the size of a ping pong ball was seen just below the greater curvature of the stomach near the pylorus, but quite separate from it. A third mass, measuring 3 by 2 inches was noticed just above the left kidney (plate VIII, figure 4). On histological examination the gastric growth showed the structure of an adenocarcinoma; masses below the structure of lymphatic glands infiltrated with adenocarcinomatous process. The mass just above the left kidney was found to be the left suprarenal, which was extensively infiltrated with the same tumour. On examining a number of blocks from the left suprarenal it was seen that very little of the adrenal structure was left. The entire growth consisted of adenocarcinoma with very scanty adrenal tissue here and there (plate VIII, figure 5).

Commentary.—Gastric carcinoma has a wide metastatic spread but infiltration into the suprarenals is rare (Ewing, 1931). The lymphatic spread of this tumour is obvious from the microscopic picture of the abdominal lymphatic glands but there must have been hæmatogenous spread also because otherwise the suprarenal metastasis cannot be explained. The extensive suprarenal involvement, which has almost entirely replaced the gland structure, must have been of long duration, putting the gland out of function for some time. The right suprarenal was not available.

Case 3.—J. M., male, aged 40, admitted into the hospital on 28th February, 1939, with the following history:—

Asthma for the last 12 years; extreme difficulty in breathing for about 24 hours. On examination signs of cavitation at the apex of the right lung were detected and a diagnosis of pulmonary tuberculosis was made. He died on 6th March, 1939, and the autopsy examination showed bilateral plastic pleurisy and emphysematous condition of both lungs. Right lung showed two cavities at the lower part of the base and miliary tubercles in the whole of the lower lobe. Left lung showed consolidation at the base. Liver was congested and enlarged. Spleen was congested. Both the suprarenals were palpably enlarged, the right one being the larger. No other gross abnormality was detected. The enlarged suprarenals were then studied. They felt hard; on cutting through, the glands were found to be hæmorrhagic looking with pale yellowish areas within (plate VI, figures 6a and 6b). The consistency was homogeneous.

Microscopical examination.—The normal pattern of the gland was completely disorganized and the cortical and medullary areas could not be differentiated. The gland structure showed marked degeneration; the shadow collections are the shadow collection.

Microscopical examination.—The normal pattern of the gland was completely disorganized and the cortical and medullary areas could not be differentiated. The gland structure showed marked degeneration; the shadow cells taking only eosin stain (plate IX, figure 7). The degenerated areas were filled with red blood cells. At some areas these hæmorrhages showed signs of organization and at other places isolated islets of atrophied cortical structure could be detected interspersed with masses of red blood cells and young inflammation nor caseation could be seen anywhere. These changes were more or less in all parts of both the organs.

Commentary.—The case presented a condition of widespread degenerative changes of the glandular structures and its infiltration with blood. These bilateral changes in the suprarenal were found in a case of active pulmonary tuberculosis. The initial change seemed to be essentially a degenerative one with subsequent hæmorrhage into the substance resulting in the gross increase of the size of the organ. Guttman (1930), while discussing the rôle of degenerative changes of the adrenals in the causation of Addison's disease, pointed out the rare possibility of tuberculosis as the ætiologic factor of the degeneration. In the present case, though associated with active pulmonary tuberculosis, the suprarenal itself showed no caseation or any picture to suggest a tuberculous process. Our figure 7 is very similar to some of the pictures produced by Guttman, viz, degeneration of the gland substance which is infiltrated with red blood cells but the case reported by Guttman showed the organs to be small and thin.

Case 4.—C. C. P., male, aged 60, was admitted into the hospital on 27th February, 1940, in the following condition:—

Unconsciousness with flaccid paralysis of the right upper and lower limbs, contracted pupils, blood pressure 165/115; pulse 100, respiration 28. A diagnosis of cerebral hæmorrhage was made. A week later the patient died; on post-mortem examination the following findings were made—extensive hæmorrhage in the left corpus striatum, hypostatic pneumonia, hypertrophied left ventricle and marked atheroma of the aorta. The left suprarenal was enlarged about twice the normal size. The right suprarenal was normal. On examination, left suprarenal was found to be purplered in appearance, the normal cream colour being absent. On cutting through the organ it was found to be frankly hæmorrhagic. Histological examination showed that the structural units were present but there was enormous congestion and at places free red blood cells were found scattered within the gland substance. This hæmorrhagic condition was so marked that in most of the blocks studied the glandular element was seen as islets in the midst of masses of red blood cells (plate X, figure 9). There were no degenerative changes in the adrenal tissue but the usual normal arrangement was lost.

Commentary.—This is a case of senile cerebral hæmorrhage with associated suprarenal hæmorrhage. It seems probable that the factors which were responsible for the cerebral lesion caused the adrenal damage too, viz, vascular sclerosis.

Case 5.—A. R., aged 35, male, admitted on 30th March, 1928, with the following complaints:—

- (1) Frequent motions, about ten times in 24 hours—duration a month and a half.
- (2) Pain in the hypogastric region before and after the motions—the same period.
  - (3) General wasting.
- (4) Fever, daily rise of temperature up to 102°F. for a month.

History.—About a year ago he had an attack of a similar nature, viz, loose motions seven or eight times daily for one month, with fever and cough. After a month he got over the attack which recurred after a month and a half and for which he went to hospital. A diagnosis of pulmonary tuberculosis was made. In the hospital he continued to have the loose motions and fever. Blood examination showed secondary type

of anemia, formaldehyde test was positive. Stool examination showed no significant findings.

He died on 3rd July, 1928, and an autopsy showed advanced pulmonary tuberculosis a short summary of which was published (De and Chatterjee, 1934) but no detailed description of the suprarenal was noted. The left suprarenal gland was found to be grossly involved in a suppurative process. The organ was not much enlarged but appeared nodular. On cutting through the substance it was found to be composed mainly of suppurative process. substance it was found to be composed mainly of suppurative material which almost completely filled the gland. On histological examination the characteristic appearances of actinomycotic infection (plate X, figure 10) were seen. Very little gland structure was present. Actinomycotic foci were present in a sinus on the left upper arm and the left kidney showed extensive actinomycotic involvement.

Commentary.—The actinomycotic invasion of the suprarenal gland was a part of the generalized actinomycotic infection accompanying pulmonary tuberculosis. The left suprarenal was evidently completely out of function; the gland did not show any compensatory reaction.

Case 6.—A. S., female, aged 30, was admitted into the emergency ward of the hospital on 1st June, 1938, with the following symptoms:—

Pain in the chest, cough with expectoration and fever; duration four months. She gave a history of previous hæmoptysis.

examination—the patient was found to be extremely emaciated; temperature 101°F. and pulse rate 110 per minute, respiration 32 per minute. Both the lungs were full of râles and crepitations. Heart sounds were feeble but regular. A clinical diagnosis of pulmonary tuberculosis was made. She took her discharge on 3rd June. On the morning of 5th June she was found in a condition of exhaustion and was mided up by an architecture. picked up by an ambulance and admitted into the hospital. The pulse was almost imperceptible and the patient was in a moribund condition. She died twenty-four hours after her re-admission. An autopsy was An autopsy was performed on 8th June and the following conditions were observed :-

The general appearance showed much emaciation. Both the pleural cavities were obliterated by dense adhesions. Right lung showed no gross abnormality. Left lung showed numerous cavities of varying size, which were distributed throughout the upper lobe. Extensive caseous pneumonic consolidations were found throughout the lower lobe. Left hilar lymph glands were enlarged and caseous. The small intestine at its lower part showed a number of ulcerated areas, tuberculous in nature. Adrenal glands—both the glands were enlarged; nearly half of the right adrenal was replaced by yellowish-white caseous looking areas; the left gland was also extensively involved (plate VI, figures 11a and 11b) and on section many small caseous foci were seen scattered throughout the organ. Scrapings from the lung and intestinal ulcers showed acid-fast bacilli; scrapings from the necrotic areas of the suprarenals did not show any acid-fast bacilli.

Microscopical anatomy.—The section of the lung showed some areas filled with large mononuclear phagocytic cells, lymphocytes, scanty fibrous tissue network, many neutrophilic polymorphonuclear and red blood cells, and other areas showed at homogeneous caseous areas. Giant cell formation was not seen; intestine—sections showed typical tuberculous type of granulation

Suprarenal—there were large areas of coagulative necrosis destroying the gland tissue completely. The cortex and the medulla of both the organs were extensively involved with very small isolated islets of cortical substance left (plate XI, figure 12). No giant

Commentary.—The case showed bilateral tuberculous involvement of the suprarenal glands in association with active pulmonary and intes. in association that intestinal tuberculous lesions. Though the destruction was extensive the case showed no obvious

Case 7.—J. R., male, aged 55, motor driver by occupation, was admitted into the hospital on 22nd February, 1940, with the following complaints:

- (1) Difficulty in breathing—duration four years,
- (2) Palpitation—one year.
- (3) Inability to walk because of general weakness one month.
  - (4) Loss of weight.

History.—About five years back he had an attack of palpitation from which he suffered for about a year. It would come at about ten or twelve days' intervals and would last for about five minutes. After some treatment this trouble was relieved. After a few months of respite he began to experience difficulty in breathing off and on, which gradually increased in severity, the last four months prior to his admission the difficulty became very marked and the palpitation also reappeared. Because of his respiratory difficulty, palpitation and extreme weakness in walking and gradual loss of weight, he sought hospital aid. The patient had a past history of syphilis and gonorrhea for which he was treated. He had several attacks of malaria. There was nothing particular in the family history. He was addicted to opium which he took daily. He had nocturnal sweats which sometimes were There was nothing particular in the family rather excessive.

On examination.—A man with an anxious look and gasping. There was slight cyanosis and the extremities were cold. He was orthopnæic and the difficulty was both inspiratory and expiratory in nature. There was epigastric pain and he often felt giddy. There was always a sort of sinking feeling.

Progress in the hospital.—The patient continued to go downhill with three main features, viz, extreme tired feeling, marked insomnia and dyspnœa.

Blood report—hæmoglobin 70 per cent, red cells 3,600,000 per c.mm., leucocytes 11,236 per c.mm., polymorphonuclears 74 per cent, lymphocytes 32 per cent, monocytes 4 per cent, eosinophils 2 per cent, sputum no acid-fast bacilli. Blood urea 40 mgm. per cent, NPN 47 N.P.N. 47 mgm. per cent, cholesterol 354 mgm. per cent, chloride 402.7 mgm. per cent, urine urea 0.3 mgm. per cent. The patient died on 22nd February, 1940.

Post-mortem findings: Left pleural cavity.—Recent adhesions at the apex and antero-laterally. Right pleural cavity—normal. Left lung was emphysematous and there were introduced the control of the contr and there were interlobar adhesions present; base edematous and bronchioles were much dilated. Right lung—voluminous and cedematous. Heart—weight 250 gm. and flabby. Spleen—enlarged with capsular thickening. Liver—congested and blackish looking. Heart-weight thickening. Liver-congested and Gastro-intestinal tract—no gross abnormality. and spinal cord—no abnormality. Thyroid gla abnormality. Right kidney—on section a small necrotic area about ½ by ½ inch in size was seen in the medulianear the lower pole (plate VI 6 man 12) Histological and spinal cord-no abnormality. near the lower pole (plate XI, figure 13). Histological sections from the area showed the typical tuberculous nature of the lesion. nature of the lesion, viz, caseation and giant cell formation (plate XII, figure 14).

Suprarenals.—Both the organs were much enlarged to the size of 2½ by 2 by ½ inches with marked nodular surfaces. On cutting the surfaces were On cutting through the glands these found to be entirely composed of cheesy material which at places was seen broken. at places was seen broken down and a thick, creamy material escaped out of the mass figure 13). Both the glands showed the above pittle and the normal glandular appearances were absent. On histological sections appearances were found absent. On histological sections—caseation was found everywhere. No giant cells were seen. The normal cortical and medullary structures had completely appeared and in only one of the blocks a slight cortical and medullary structures had completely appeared and in only one of the blocks a slight cortical and medullary structures had completely appeared and in only one of the blocks a slight cortical and medullary structures had completely appeared and in only one of the blocks a slight cortical and medullary structures had completely appeared and in only one of the blocks a slight cortical and medullary structures had completely appeared and in only one of the blocks as slight cortical and medullary structures had completely appeared and in only one of the blocks as slight cortical and medullary structures had completely appeared and in only one of the blocks as slight cortical and medullary structures had completely appeared and in only one of the blocks as slight cortical and medullary structures had completely appeared and in only one of the blocks as slight cortical and medullary structures had completely appeared and in only one of the blocks as slight cortical and medullary structures had completely appeared and in only one of the blocks. appeared and in only one of the blocks a slight cortice element was seen (plate VII) element was seen (plate XII, figure 15).

PLATE VII

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Fig. 2.—Case 1. Low power photomicrograph of a section of the tumour. It is composed of ganglion cells and it is encapsulated by fibrous tissue. At one corner the remnants of the normal gland structure is seen. × 175.

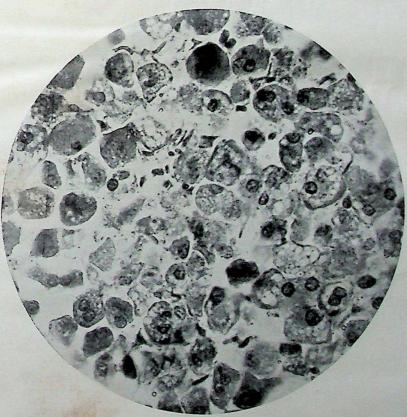


Fig. 3.—Case 1. High power photomicrographic view of the tumour cells. Note the double nuclei in some of the cells. The vacuolated appearance of the cells is apparent. × 500.

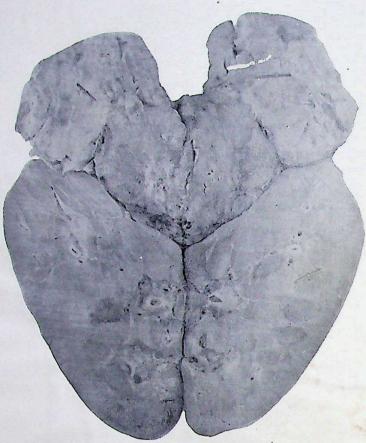


Fig. 4.—Case 2. Photograph of the suprarenal tumour with the left kidney. The suprarenal is completely replaced by the tumour mass.



Fig. 5.—Case 2. Photomicrograph of the section of the suprarenal tumour. The adenocarcinomatous process is seen extensively infiltrating the gland substance. × 265.

PLATE IX



Fig. 7.—Case 3. Photomicrograph of a section of the gland well showing the advanced degenerated condition; a few shadow cells are still seen. × 340.

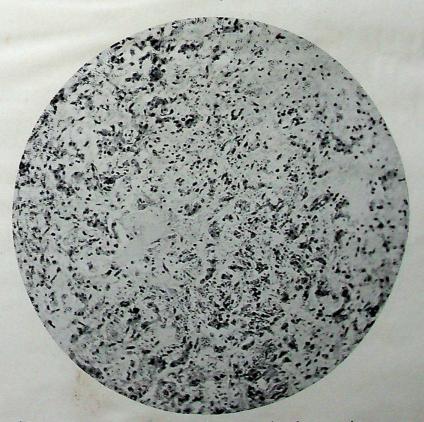


Fig. 8.—Case 3. Photomicrograph of a section from another area of the gland showing the islets of remnants of gland substance; masses of red blood cells are present all over and fibroblasts are also seen. × 265.

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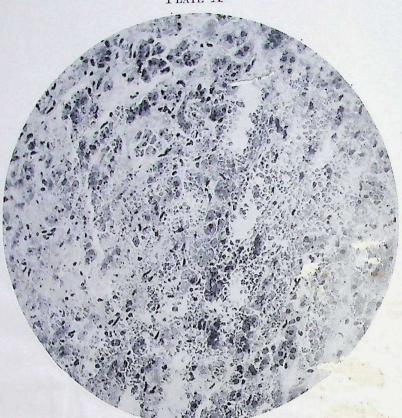


Fig. 9.—Case 4. Photomicrographic view of a suprarenal gland showing the congestion and har gland substance. × 500.



Fig. 10.—Case 5. Photomicrograph of a section of a piece of suprarenal gland showing the actinomytic foci within the gland; the leukocytic layer around the bacterial colony is well seen. × 265.

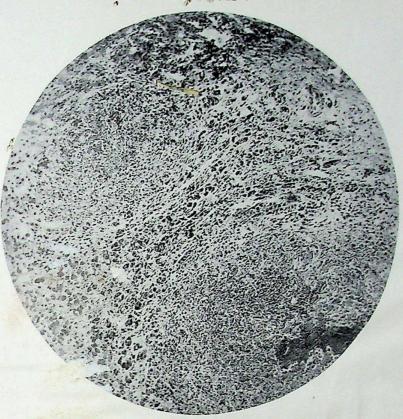


Fig thotomicrographic view of the suprarenal gland necrosis. A few altered gland cells are also in the field. × 265.

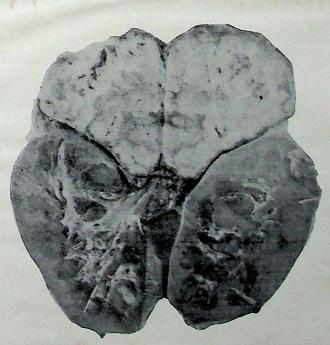


Fig. 13.—Case 7. Photograph of the left kidney with the suprarenal gland. In the medullary substance of the lower pole of the left kidney a small necrotic area is seen. The extensive involvement of the suprarenal is apparent. The other suprarenal showed similar change.

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Commentary.—Extensive bilateral tuberculous process was evident. There was no sign of tuberculous lesions anywhere else excepting the focus in the left kidney. Tuberculasis of the suprarenals is always secondary but the primary lesions may or may not be noticeable. The spread is by the hæmatogenous route. Secondary spread from the kidney is extremely rare (Boyd, 1935). In the present case the active lesion in the left kidney is in all probability the primary lesion.

Discussion.—The suprarenal glands are not a common site for disease. Out of two thousand unselected autopsies the organs were found to be diseased only in 16 cases. It is surprising that except in one case (case 7) none of these showed the usual signs of suprarenal failure—the Addison's disease syndrome—the characteristic pigmentation, extreme weakness, gastro-intestinal disturbances and low blood pressure. Unfortunately in the cases under review the blood pressure records were not complete and so no observation can be made on that point. Addison's disease is a rare condition. Diseased suprarenals are not necessarily associated with the Addison's disease syndrome because of the fact that a slight amount of healthy structure may be sufficient for life or an unnoticed aberrant adrenal structure might take up the functions. In our series all the seven cases showed complete disorganization of one of the glands and both the glands in three cases but only in case 7 was there suggestion of adrenalin failure—gastro-intestinal distinutions and extreme weakness. Both in cases 6 and 7 bilateral destruction of the gland had existed for a long time yet neither showed the most constant characteristic, viz, pigmentation, although cases of Addison's disease are possible without pigmentation (Hadfield and Garrod, 1938, and Guttman, 1930).

Atrophy, tumour, syphilis, degenerative and vascular changes and tuberculosis are the usual causes of Addison's disease of which tuberculosis accounts for 70 per cent. Our table shows 352 tuberculosis cases out of two thousand autopsies (roughly 18 per cent). Out of these 352 cases the tuberculous involvement of the suprarenal occurred only in two cases (about 0.56 per cent). From the figures of different workers Guttman collected the percentages of tuberculosis of the suprarenals in association with pulmonary tuberculosis which ranged from 2 per cent to 5 per cent. In our series the figure is still smaller. Considering the prevalence of tuberculosis in Bengal the incidence of Addison's disease due to tuberculosis would be expected to be higher. Another in Addison's Another interesting point is that in Addison's disease due to tuberculosis of the suprarenals, usually there is no manifestation of active tuberculosis anywhere else in the body. In the two comes under review one showed extensive active exudative type of tuberculosis of the lung and intestine and in the other one there was involvement of the kidneys. It is noted that because of

the rarity of Addison's disease, unless all the classical signs and symptoms are present it is not surprising that the condition might be overlooked. In both the cases 6 and 7 on autopsy, the bilateral extensive destruction was clear but neither gave any definite indication of the possibility of frank Addison's disease.

With regard to the rôle of the cortex and the medulla in the production of Addison's disease, there were long controversies in the past, but the balance of evidence at present seems to place the cortical portion as mainly responsible for the signs and symptoms, although the part played by the medulla is not altogether insignificant. In our cases no differential study from this point of view is possible because in all instances both the cortex and the medulla have been markedly involved. In case 1 the origin of the tumour was of course from the medulla, but by simple increase of size the cortical part has been extensively involved by pressure effects. It is significant that in unilateral lesions there was no compensatory hypertrophy of the other healthy. gland.

#### Summary

- (1) In two thousand unselected autopsies, suprarenal lesions were found in sixteen cases.
- (2) Out of three hundred and fifty-two cases of tuberculosis, pulmonary and intestinal, only two cases showed involvement of the suprarenal glands.
- (3) A unilateral suprarenal lesion fails to produce Addison's syndrome and extensive bilateral destruction of the glands does not necessarily result in a frank picture of Addison's usease.
- (4) Two cases of tuberculosis, a case of secondary actinomycosis, hæmorrhage, degeneration, secondary adenocarcinoma and ganglion neuroma of the suprarenal gland are described in detail.

Our thanks are due to Lieut.-Colonel J. C. De, Principal and Superintendent, Medical College, Calcutta, for the case records and also to the staff of this department specially to Dr. D. M. Gupta, M.B., Curator of the Museum, for the help rendered.

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# RESPIRATORY DYSPNŒA FOLLOWING ADMINISTRATION OF BARIUM MEAL

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THE purpose of this note is to bring to the notice of the profession that certain untoward symptoms may follow the administration of a barium meal. The senior author, as a visiting physician of the Carmichael Hospital for Tropical Diseases, Calcutta, has under his care a large number of cases of gastro-intestinal disorder and various other conditions where a search for septic foci is of primary importance from the point of view of diagnosis and treatment. During a patient's stay in the hospital a complete investigation is carried out as a routine procedure, and complete examinations of the blood, stools, urine, sputum, etc., are made. The administration of a barium meal to ascertain the condition of the gastro-intestinal tract has often to be done. In a previous paper Chopra, Hayter and Bhattacharya (1937) have given an account of the radiological investigations of the gastro-intestinal disturbances encountered in the tropics. Though no untoward effects were observed by them in a large series of cases after an opaque meal, the question of occurrence of toxic symptoms cannot be discarded altogether. Recently the present authors have observed marked symptoms of respiratory ayspnæa in two of their cases in the hospital, which apparently started after the administration of an opaque meal. One of these patients was admitted into the hospital with a history of asthma and had been under treatment for a long time for this condition. The other case gave no history of asthma at any period and was admitted for chronic gastro-intestinal disorder attended with pain in the right iliac fossa. The opaque meal was administered as follows:-

The patient was given 2 drachms of pulv. glycyrrhiza compound overnight followed by a simple enema the next morning. The contents of one vial of citobaryum (150 gm.) dissolved in about 16 ounces of milk were given. Skiagrams were taken, immediately after the meal, 5 hours, 10 hours, 24 hours, 48 hours and if necessary after 72 hours. No purgative was given to the patient before the x-ray examinations completed, i.e., in the majority of the cases after 48 hours, and in some after 72 hours.

Case 1.—A Hindu female, aged 28 years, was admitted on 14th October, 1938, with history of asthmatic attacks, headache, irregularity of menstruation and leucorrhœa. She is the mother of eight children. There is no history of asthma on the father's side but the mother suffered from asthma.

Onset of asthmatic symptoms occurred soon after her marriage at the age of 15, after a 'cold' which

developed into chronic bronchitis; frequent attacks of asthma followed later. Severe attacks of asthma occurred after the birth of the first child; for these capitals 30 injections of soamin and was free free. occurred after the blief of soamin and was free from she received 30 injections of soamin and was free from she received so injections of countries and was free from symptoms for about two years. Curetting of the uterus was demarked the birth of the second child and she was tirely free from attacks till after the was demaratively free from attacks till after the birth of the fourth child. From this time onward there was of the fourth child. I follow the frequent attacks of asthma occurred. Change of climate did no good asthma occurred admission into the hospital occurred. A few months before admission into the hospital, the A few months before admission into the hospital, the patient was experiencing difficulty in breathing throughout the greater part of the day and night and this could only be relieved with frequent injections of adrenalin. The asthmatic attacks were worse during the menstrual periods and during winter than during the summer. Heavy meals and rich food brought about an attack immediately; the patient was a strict regretarien

Physical.—She is fairly well built; tongue slightly coated; no evidence of sepsis in the teeth. There is some deviation of the septum to the right, and a certain amount of catarrhal ethmoiditis and generalized certain amount of catarrhal ethmoiditis and generalized pharyngitis is present. The skin is normal at present but there is history of an urticarial rash two months previously. The lungs show prolonged expiration with marked wheezing sounds. The heart sounds are not strong but there is no abnormality. The liver and spleen are not palpable, there is tenderness and rigidity over the right iliac fossa. Tendon reflexes normal, the pupils react to light and accommodation normally.

Laboratory investigation.—Blood—hæmoglobin 108 per cent (Hellige), erythrocytes 5,520,000, leucocytes 7,900, polymorphonuclears 54 per cent, small mononuclears 37 per cent, large mononuclears 3, per cent, eosinophiles 6 per cent, Arneth count 40, 36, 16, 6.2, index 84. Stools contain no abnormal protozoa, bacteria or ova. There was nothing abnormal in the urine; blood pressure 110/90; gastric analysis showed normal acid curve; electrocardiogram normal. Skiagram of chest showed nothing abnormal except accentuation of the shadows of the bronchioles. Dermal tests for hypersensitiveness to foods were carried out with negative results. Sputum culture showed Streptococcus non-hæmolyticus, Pneumococcus, N. catarrhalis; no acid-fast bacilli culture found.

P. V. examination.—Uterus slightly retroverted. Cervix is healthy and there is no tenderness in the

For purposes of investigation of the condition of the gastro-intestinal tract, barium meal was given on 10th November, 1938, and skiagrams were taken at the hours specified above. The reading of the x-ray plates showed showed:

Stomach.—J-shaped; position and size normal; filling normal, motility and tone good, no ulcer. There was residue of meal after five hours which persisted for ten hours.

Duodenum.—Duodenal cap was well formed and there was no tenderness.

After 10 hours.—Jejunum and ileum showed residue at ten hours. Appendix visualized at ten hours.

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24 hours and 48 hours.—The distal parts of the colon were spastic and showed the 'string sign' of had The appendix was visualized, it was elongated, had irregular lumen and showed the presence of concretions irregular lumen and showed the presence of concretions. Residue in the appendix was visible after 48 hours, the tip appeared to be adherent and tenderness was present, probably pathological.

This patient with usual treatment for asthus was progressing satisfactorily. After the administration of a hard istration of a barium meal on 10th November, the same 1938, the patient had slight dyspnœa the same day which was a slight dyspnœa the antiday which was controlled at first with meal spasmodic drugs. Twelve hours after the meal the symptoms were the symptoms were considerably aggravated and the patient had the patient had very severe and persistent asthmatic attacks asthmatic attacks and developed well-marked

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cyanosis. Drugs such as ephedrine, atropine and even adrenalin which usually gave immediate relief failed to control the symptoms. She had severe dyspnæa all the time, so mæh so that oxygen had to be given with a nasal catheter continually for 24 hours. In addition, she was given glucose and sodium bicarbonate per rectum by the drop method. An attack of such severity and persistence has occurred for the first time. It lasted for nearly 72 hours and gradually subsided after the barium meal was thoroughly evacuated with purgatives.

Case 2.—E. M., male, aged 27 years, admitted with the history of an acute attack of pain over the right iliac fossa one year ago. A similar attack followed one month later, and subsequently the patient complained of localized tenderness over the region of the appendix, he was admitted for investigation on 22nd October, 1938.

Physical examination.—The patient was of average build. There was no evidence of sepsis in the teeth; tongue, ear, nose and throat showed no gross abnormality; lungs and heart normal; liver and spleen not palpable, genito-urinary tract nothing abnormal; the pupils reacted normally to light and accommodation; other reflexes normal.

Laboratory examinations showed stool negative to abnormal bacteria, protozoa and ova; urine no albumin, no sugar. Blood—hæmoglobin 119 per cent (Hellige), erythrocytes 5,250,000, leucocytes 11,100, polymorphonuclears 54 per cent, small mononuclear 16 per cent, large mononuclear 10 per cent, eosinophiles 18 per cent, Arneth count 50, 30, 16, 3, 1, index 88. Blood pressure 120/80; gastric analysis showed a normal acid curve; dermal tests for hypersensitiveness to foods, negative; sputum on culture shows Streptococcus non-hæmolyticus, Pneumococcus, and N. catarrhalis.

The patient was given a barium meal for examination of the appendix. On the day of examination he complained of an irritative cough which was relieved by administration of mild antispasmodies. Within twelve hours, however, he showed marked symptoms of dyspneae with feeling of tightness across the chest which developed into a typical asthmatic attack. On examination of the lungs, inspiratory and expiratory rhonchi were heard all over on both sides. Skiagram of the chest revealed accentuation of the hilus shadow; peribronchial glands were calcified; no infiltration present. In the nose there was no gross abnormality but there was evidence of rhinitis.

The attack was persistent and the patient was given injections of adrenalin which gave him temporary relief. The acute symptoms lasted for about 48 hours and did not disappear till the barium meal was cleared with a purgative. The lungs did not clear up completely for about a fortnight.

The reading of the x-ray plates showed:—Stomach normal size; motility normal.

4 hours. Stomach clear; meal rushed through the small intestines and reached the pelvic colon.

on itself. The appendix was visualized and was coiled

24 to 36 hours. Residue was seen in the appendix. The appendix appeared to be pathological.

#### Discussion

Two instances are recorded where, following the administration of a barium meal for investigation of the condition of the gastro-intestinal tract, the patients exhibited signs and symptoms in case 1 the patient was a sufferer from asthma but in the other case, the patient was

admitted for pain in the iliac fossa and did not give any history of asthmatic attacks previously. Although these cases do not warrant a general conclusion to be drawn, the symptoms which followed were so striking that the subject is worthy of further investigation. In case 1, the symptoms occurred during the quiescent period when the patient had recovered with rest and treatment. The administration of a barium meal in this case appears to have brought about the attack in a very aggravated form. In the second case there was no history of asthma pre-The symptoms in very acute form appeared and severe dyspnea lasting for about forty-eight hours followed. There was further a tendency to dyspnea for about a fortnight after the administration of the meal.

What was the reason for the appearance of these asthmatic attacks? Were they due to some form of allergy or were they produced by the specific action of barium on the bronchial musculature. It is well known that barium is the most toxic of the alkaline earths. The soluble salts of barium are, however, absorbed very slowly from the intestinal tract. Barium sulphate, which is used for radiographic examination of the gastro-intestinal tract, is not absorbed, at least in any appreciable quantities, and passes through the body unchanged. It is, therefore, imperative that barium sulphate administered must be absolutely pure. Toxic symptoms have followed the administration of barium meals on account of contamination with more soluble salts such as the chloride or sulphide.

Further, barium has a specific action on both striped and the non-striped muscle. It has been shown that a more prolonged and stronger contraction may be obtained in a frog's muscle under its action, probably because of its stimulant action on the contractile substance of the muscle fibres. The contractions of the involuntary muscles in the body such as those of the gastro-intestinal canal, the bronchi, etc., are stimulated. Intravenous injection of barium salts in experimental animals produces augmentation of the movements of the involuntary muscles of the whole body with severe vomiting, evacuation of the bowels and the bladder and marked contraction of the bronchioles. action of barium is thus a selective action on the smooth muscle.

It is, therefore, possible that minute quantities of barium may have been absorbed in these cases, producing contraction of the bronchial musculature and persistent symptoms of asthma. If that is so the quantities absorbed must be so minute as to be undetectable by the ordinary chemical or spectroscopic methods.

A further point of interest in both these cases is that the appendix was pathological and undoubted signs of irritability of the vagus were present. Whether the presence of this irritability rendered the musculature supplied by the

(Continued at foot of next page)

# NOTES ON THE KALA-AZAR RESEARCH IN CHINA

THE USE OF 'DISTIBINYL' IN THE TREATMENT OF CHINESE KALA-AZAR

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## I. Introduction

Various pentavalent antimony compounds, such as 'Neostibosan', 'Neostam', 'Aminostiburea' and 'Solu-stibosan', have been employed by workers in China, in India and elsewhere in the treatment of kala-azar. The only serious disadvantage of the pentavalent compounds is their high cost, a matter of some moment, when, as in case of China, some hundreds of thousands of kala-azar patients still require treatment. Attempt was made by Dr. C. K. Liang of the Department of Chemistry and Pharmaceutics, Central Field Health Station, Nanking, China, to obtain some form of pentavalent antimony compounds, if not better, at least equal to the various preparations which have already appeared in the market. A series of confirmed kala-azar cases has been put on trial by the author at the Kala-azar Research Station, Tsingkiangpu, the endemic centre of kala-azar in China in the year 1937, to see the efficacy of treatment with the native product which has been produced by Dr. Liang.

### II. Chemical constituents and toxicity

'Distibinel' is the diethylamine salt of di-pminophenylstibinic acid and contains 40.6 per cent of antimony. It is a greyish-white powder very soluble in water giving a brown-yellow solution. It is preserved in dry sealed tubes and is not stable if exposed to air for more than one day.

The toxicity of 'Distibinyl' has been tested on white rats. The maximum tolerable dose has been found to be 200 milligrammes per kilogramme of body-weight of rat.

### III. Preparation of solution and mode of administration

'Distibinyl' is used intravenously dissolved in cold distilled water. The solution should not be boiled. For making solutions dissolve 0.05 gramme in 1 c.cm., 0.1 gramme in 2 c.cm., 0.2 gramme in 4 c.cm., 0.3 gramme in 6 c.cm., of water. Always use fresh solution.

## (Continued from previous page)

vagus more sensitive to minute quantities of barium is a suggestion for consideration.

#### REFERENCE

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## IV. Method of study

Prior to the treatment, diagnosis was confirmed by the finding of Leishmania donovani from the liver puncture, either in direct smears or in culture. Patients were then admitted to the wards of the Kala-azar Research Station during the course of treatment under our close observation. Temperature, pulse and respiration were taken every day at 8 a.m., and 12, 4, and 8 p.m. Serum tests were examined before treatment, at cessation of treatment, and one month, three months and six months after treatment. Leucocyte and differential counts were taken and urine samples were regularly. Stool examined at different intervals to eliminate the other parasitic infections and to see if there was any albumin in the urine. Unfortunately our experiments had to be discontinued in the middle of November 1937 and the number of cases under our observation was limited to 126, out of which 55 cases came back three months and 14 cases came back six months after treatment. However, from the data obtained so far, we have concluded this experiment to see the efficacy of treatment with 'Distibinyl' and further study will be continued as soon as we resume our routine work in the Station at Tsingkiangpu.

The tables given are summarized results to

### V. Dosage

The initial dose varies from 0.025 to 0.50 gramme with an average of 0.10 gramme. The maximum dose varies from 0.10 to 0.60 gramme with an average of 0.30 gramme. Number of injections varies from 6 to 14 with an average of 9. Number of days of injections during each course of treatment varies from 6 to 32 with an average of 10. For those cases treated for more than 15 days, the injections were duly given every other day instead of every day (tables III, IV, VI and VII). The total doses per 45 kilogrammes body-weight vary from 1.15 to 2.99 grammes with an average of 2.10 grammes to cure (table V).

# VI. The course of disease under treatment

The fever.—After about the fourth injection the patient is usually free from fever. In the majority of cases, the fever disappears after the first or second injection, although in others a low fever persists until the week end after the beginning of treatment. A reactionary rise of temperature may occur after each injection, though a sudden sharp rise in a patient who has not previously shown not previously shown any reaction is indicative of too large. of too large a dose having been given (table VIII) VIII)

Body-weight.—At the end of treatment, over 40 per cent of cases showed increased weight: the others with the end of treatment, over the state of the weight; the others with no increase and a cases with slight devices. cases with slight decrease. At one month and three months after transfer three months after treatment there is a marked increase in all account

increase in all cases (table IX).

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Spleen and liver.—In the majority of cases, the spleen decreases rapidly in size by the end of treatment. In some cases the decrease is slower, but decrease continues for some time after treatment has terminated. Practically the spleen becomes not palpable by the end of six months after treatment. The liver on the other

TABLE I
Age

Age	Number of cases	Percentage								
$\begin{array}{c} 1-10 \\ 11-20 \\ 21-30 \\ 31-40 \\ 41-50 \\ 51-60 \\ 61-70 \end{array}$	11 58 25 13 8 9	8.73 46.03 19.84 10.32 6.35 7.14 1.59								
TOTAL	126	100.00								

#### Table II Sex

Sex	Number of cases	Percentage		
Male Female	92 34	73.02 26.98		
TOTAL	126	100.00		

# Table III - Initial dose

Dosage	Number of cases	Percentage
0.025 0.05 0.10 0.15 0.25	6 39 53 26 2	4.76 30.95 42.07 20.63 1.59
TOTAL	126	100.00

# Table IV Maximum dose

Dosage	Number of cases	Percentage
0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.60	2 14 13 37 16 17 19 7	1.59 11.11 10.30 29.37 12.70 13.49 15.08 5.56 0.80
TOTAL	126	100.00

Table V

Total dose per 45 kilogrammes
body-weight

Dosage	Number of cases	Percentage
0.80-0.99	7	5.56
1.00-1.19	17	13.49
1.20-1.39	15	11.90
1.40-1.59	13	10.32
1.60-1.79	5	3.97
1.80-1.99	9	7.14
2.00-2.19	13	10.32
2.20-2.39	11	8.73
2.40-2.59	18	14.28
2.60-2.79	14	11.11
2.80-2.99	2	1.59
Above 3.00	2	1.59
TOTAL	126	100.00

Table VI Number of injections

Number of injections	Number of cases	Percentage		
6 7 8 9	11	8.73		
7	29	23.02		
8	19	15.07		
	21	16.67		
10	22	17.46		
11	15	11.90		
12	3	2.38		
13				
14	6	4.77		
TOTAL	126	100.00		

Average number of injections—9

# Table VII Days of injections

Number of days		Percentage		
uays	cases			
6	11	8.73		
6 7 8 9	29	23.02		
8	19	15.08		
	23	18.25		
10	14	11.11		
11	11	8.73		
12	4	3.17		
13	1	0.79		
14	4 1 5 1 1 1 3 1	3.95		
15	1	0.79		
20	1	0.79		
21	1	0.79		
23	1	0.79		
· 26	3	2.33		
30	1	0.79		
32	1	0.79		
Total	126	100.00		
Average	10			

hand rarely decreases until after the injections have been discontinued (tables X and XI).

General condition.—The general condition improves almost immediately, the improvement being noticeable even after one or two injections.

Length of the course of treatment.—The length of the course of treatment at present is difficult to determine. The mean total dose per

TABLE VIII
Subsidence of fever

After the beginning of treatment	Number of cases	Percentage
Total 1 day	126 80	. 100.00 63.49
2 days	20 14	15.87 11.11
3 " 4 " 5 "	5 3	3.97
6 ,,	1	2.38 0.80
7 "	3	2.38

Table IX
Increase of body-weight

	END		END 1 MONTH		3 MONTHS		6 MONTHS	
	No.	%	No.	%	No.	%	No.	%
No increase Increase	31 24	56.36 43.64	7 48	12.73 87.27	2 55	3.51 96.49	14	100.00

45 kilogrammes body-weight was 2.1 grammes with an average number of ten injections.

Laboratory findings.—Over 56 per cent of the cases showed negative findings for Leishmania donovani from their liver punctures at the end of treatment. Practically all the cases became negative one month after cessation of treatment (table XII).

The increase of white cell counts, increase of polymorphonuclears, decrease of large mononuclears and marked increase of eosinophiles are also indications of cure (tables XIII and XIV).

The result of the sero-reactions on the cases resembles that obtained from those cases treated with other antimony preparations, *i.e.*, the peptonate of iron test also acts as the 'signal' for cure and it becomes negative in all cases about six months after treatment.

## VI. Complications associated with treatment

Some complications of kala-azar which sometimes arise during treatment with other antimony preparations, namely, pneumonia, shock, urticaria, ascites, jaundice, hæmoptysis, herpes zoster, mastoiditis and nephritis, have not been observed in any of our cases. Slight degree of diarrhæa and vomiting is not infrequently encountered when too large a dose has been given. Slight abdominal pain was observed in 50 cases whose stool examinations all revealed numerous ascaris eggs. Epigastric distress, cough and headache were present in 12, 15 and 9 cases respectively. One case each showed swelling of scrotum and blister formation and similar conditions have also been observed in the treatment with other antimony preparations.

Table X
Enlarged spleen

	Before 7	BEFORE TREATMENT END OF TREATMENT		ONE MONTH AFTER TREATMENT		THREE MONTHS AFTER TREATMENT		SIX MONTHS AFTER TREATMENT		
	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage
Enlarged spleen Decrease in size No change	126	100.00	13 110 3	10.32 87.30 2.38	80 24	76.92 23.08	20 35	36.36 63.64	i 13	7.14 92.86

Table XI
Enlarged liver

	The second second		Million Com	2 may	ea weer			SAME OF SAME		
	Before TREATMENT			D OF FMENT		NTH AFTER		MONTHS REATMENT	SIX AFTER T	MONTHS PREATMENT
\$1.5 \$1.0 \$1.0	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage
Total Enlarged liver- Decrease in size No change	126 126	100.00	126 49 76 1	100.00 38.89 60.32 0.79	104 19 76 9	100.00 18.27 73.08 8.65	55 3 25 27	100.00 5.46 45.45 49.09	14 3 11	100.00 21.43 78.57

Fig. 1b.

Fig. 2b.

Fig. 3b. Showing progress in three typical cases:

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(b) One month after treatment.

Fig. 1c.

Fig. 2c.

Fig. 3c.

(c) Six months after treatment.

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Fig. 1a.

Fig. 2a.

Fig. 3a.

(a) Before treatment.



TABLE XII

The finding of Leishmania donovani from liver puncture in direct smear and in culture

	Total number examined	Pos	SITIVE	Nee	GATIVE
	examined	Number	Percentage	Number	Percentage
Before treatment	126 126 104 55 14	125 51 1 	99.21 40.48 0.96	1 75 103 55 14	0.79 59.52 99.04 100.00 100.00

TABLE XIII
Leucocyte counts

	BEFORE !	TPEATMENT	END OF AFTER TREATMENT							
*	BEFORE TREATMENT		TREATMENT		One month		Three months		Six months	
	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage	Num- ber	Per- centage
Total 600- 2,000 2,000- 4,000 4,000- 6,000 6,000- 8,000 8,000-10,000	126 30 76 16 4	100.00 23.81 60.32 12.70 3.17	126 1 80 38 7	100.00 0.79 63.48 30.16 5.56	104  8 28 44 24	7.69 26.92 42.31 23.07	55  4 11 20 20	100.00 7.28 20.00 36.36 36.36	14  3 5 6	100.00  21.43 35.71 42.86
Average counts	3,069		3,	841	6,	638	7,4	95	6,0	600

TABLE XIV

# The average percentage of the leucocytes at different intervals in respect of the treatment

	Before	End of	AFTER TREATMENT		
	treatment	treatment	One month	Three months	Six months
Polymorphonuclears Large mononuclears Lymphocytes Eosinophils Basophils Transitional	55.58 6.10 35.44 2.57 0.01 0.30	60.54 3.02 32.38 3.81 0.00 0.25	53.19 3.66 27.87 15.15 0.03 0.10	53.35 3.36 27.87 16.01 0.00 0.00	55.07 2.73 25.00 17.20 0.00 0.00

# VII. Summary and discussion

- 1. So far as the efficacy is concerned, 'Distibinyl' appears just as good as the other antimony preparations. Moreover, the serious disadvantage of the high cost in other antimony preparations is not present in 'Distibinyl'—the actual cost of this preparation has been remarkably reduced. As in the endemic area of kalazar in China, particularly in the Provinces of Kiangsu, Anhwei, Shantung, Honan and Hopeh, hundreds of thousands of victims still require treatment, mass treatment with cheaper and more efficacious preparation is worth while as a means of prevention in checking the spread of disease.
- 2. 'Distibinyl' is given intravenously by daily injections or on alternate days with an initial dose of 0.025 gramme for infants and 0.05 gramme to 0.10 gramme for adults, with the maximum dose of 0.2 gramme for infants and 0.3 gramme for adults, and with the mean total dose of 2 grammes per 45 kilogrammes bodyweight.
- 3. Evidence of recovery in the treatment of kala-azar with 'Distibinyl' can be assured by subsidence of fever, general improvement of health condition, increase of body-weight, negative finding of Leishmania donovani from liver puncture, marked reduction in the size of the (Continued at foot of next page)

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# CONGENITAL CYSTIC DISEASE OF THE LUNGS

By L. B. CARRUTHERS, M.D., F.A.C.P. Miraj Medical Centre, Miraj, S. M. C.

This condition has gone under a variety of names in the past, feetal bronchiectasis, congenital bronchiectasis, atelectatic bronchiectasis, and congenital pulmonary lymphangiectasis, but now it is generally known as congenital cystic disease of the lungs. Some standard works fail to mention it at all; others barely mention it, or refer to it as rare or as chiefly of interest to the pathologist. Still others mention its occurrence, but make little or no attempt to describe it. Boyd (1935) indicates its clinical importance and Norris and Landis (1933) give a fairly adequate description. All are agreed in calling the condition rare; more recent investigations would not seem to bear out this statement.

Until 1925, apparently no case was diagnosed clinically. In that year, Koontz (1925) reported 108 cases collected from the European literature and added one of his own. All had been diagnosed upon the autopsy findings. In 1936, Schenck (1936) collected an additional 124 cases from the world's literature and added four of his own. In the following 1½ years, Schenck (1937) reported that an additional 140 cases had

(Continued from previous page)

spleen and liver, increase of leucocyte counts, increase of polymorphonuclear neutrophile leucocytes and negative results of sero-reactions.

4. During the course of treatment and after cessation of treatment, rest and nutritious diet containing eggs and liver, will hasten the process of recovery.

5. Further study will be continued later on to see whether there is any relapse or re-infection among the treated cases.

#### VIII. Acknowledgments

The writer wishes to express his gratitude to Dr. F. C. Yen, Director, and Dr. P. Z. King, Deputy Director, of National Health Administration, to Dr. J. Heng Liu, formerly Director, Central Field Health Station, N. E. C., China, and Dr. Y. T. Yao, Chief of the Department of Parasitology, for their constant interest and encouragement on this piece of work. The writer also has pleasure in thanking Dr. C. K. Liang, Chief of the Department of Chemistry and Pharmaceutics, Central Field Health Station, and his assistants for their painstaking work in the constant supply of such a drug for this study.

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been described and to these he has added another five cases of his own, making a total of 381 cases reported since Bartholinus recorded the first case in 1687. The great majority of these cases have been reported in the last few years. Now that diagnosis has become possible during life, some of these cases have even been successfully treated.

There is no evidence that either syphilis or Koch's bacillus plays any part in the causation of this condition. The precise pathogenesis is unknown, but the prevailing opinion is that the lesion is a congenital anomaly or malformation caused by the pinching off of a small pulmonary bud during the development of the lung; this pinched-off bud continues to develop. The wall of the resulting cyst is made up of high or low columnar epithelium which may or may not be ciliated. Along with the epithelium there is muscle, elastic tissue and cartilage arranged sporadically. All point to the bronchial origin of the cyst. The retained secretions are apparently of mucosal origin. The absence of anthracotic pigment in the wall of the cyst or in its immediate vicinity would indicate its functionless nature. Other congenital anomalies of a pulmonary nature frequently are present in the same patient, often taking the form of accessory lobes or accessory lungs

Reisner and Tchertkoff (1937) feel, however, that the cause is an arrested development of the lung with a failure of the pulmonary parenchyma to form, while the existing bronchial ramifications continue to grow into abnormally large spaces. As the lungs are inflated with air after birth these spaces are distended into cysts or airsacs. According to this theory, large, solitary cysts result if the arrested development occurs early in intra-uterine life at the time when only the stem bronchus or the lobar branches are found. The smaller multiple cysts result when the arrested development occurs later. By still processes during other writers, inflammatory fœtal life have been blamed.

The cysts are solitary or multiple. They contain a milky or turbid fluid at birth and this fluid will persist unless it is evacuated by rupture into a bronchus or bronchiole. this occurs, air will replace the fluid. If the communication thus established between the cyst and the bronchus remains open and free so that air may pass in both directions, the cyst will remain stationary in size and non-expansile. Should air be able to enter the cyst, but not be free to leave here free to leave because of some valve-like effect at the communication an expansile, balloon type of cost type of cyst is produced with severe clinical results. The convergence of the convergence The same mechanism is found active in both solitary and multiple cysts. Any portion of the bronchied of the bronchial tree or of the interstitial pulmonary tissue may be involved in the production of these cyst formations. Sauerbruch (1934) believes that So (1934) believes that 80 per cent of bronchiectases seen in children and linear cent of bronchiectases seen in children and limited to one lobe are congenital in cricin genital in origin.

Schenck (1937) has modified the classification of Anspach and Wolman (1933) as follows :-

Solitary fluid cyst (at birth).

1. With no bronchial communication—solitary fluid cyst.

With bronchial communication-solitary air

cyst.
(a) With free opening—non-expansile air cyst.

(b) With one-way mechanism at the orifice expansile air cyst.

B. Multiple fluid cysts (at birth).

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1. With no bronchial communication-multiple fluid cysts

With bronchial communication-multiple or trabeculated air cysts.

(a) With free opening-non-expansile trabeculated air cysts.

(b) With one-way valve mechanism at the orifice—expansile trabeculated

The clinical manifestations of congenital cystic disease vary greatly and they depend chiefly on the extent of the lesions, their site and whether or not changes in the cysts cause changes in the intra-thoracic pressure. Symptoms of the condition are usually present from birth or make their appearance shortly thereafter. The usual clinical picture is that of recurring attacks of dyspnæa and cyanosis with or without cough. These attacks may be so mild as to escape notice or they may be so severe as to result in death. Eloesser (1931) claims that these attacks occur only when there exists an imperfect communication between the cyst or cysts and bronchus and that they should be absent either when the communication is free or does not exist at all. The attacks are most prominent when the communication is valve-like in nature and in such cases the attacks may not be relieved until the trapped air is removed by puncture, ruptures into the pleural sac, or manages to overcome the valvelike nature of the communication.

Expectoration occurs only if the cyst communicates with a bronchus, and only then if secondary infection has occurred. Such cases very suggestive of bronchiectasis. Hæmoptysis may occur and be slight or well marked enough to suggest the presence of tuberculosis. Less frequent symptoms as weakness, anorexia, palpitation and emesis may occur. Referred epigastric pain is sometimes present. The dyspnæa and wheezy breathing are very suggestive of asthma.

Physical signs are seldom very definite. They vary with the number and with the contents of the cysts present. They usually are sufficient to indicate the presence of a pulmonary lesion but rarely will they indicate its nature. Progressive dyspnœa in an adult without any apparent cause and with or without a history of preceding inspiratory infection should suggest

the possibility of the existence of the condition. For diagnosis, Wood (1934) claims that a satisfactory roentgenological study is necessary. He also states that in many instances bronchoscopic examination or x-ray after the introduction of iodized oil intrabronchially or the induction of

a diagnostic pneumothorax may be further required. Such procedures are all within the realm of the modern diagnostic clinic. differential diagnosis will depend upon the type

of cyst that is present.

Fluid-containing cysts, especially if they are full so that no fluid level appears on the skiagram, must be differentiated from intra-thoracic tumours, pulmonary abscess, empyema and dermoid or echinococcus cysts. If no fluid level appears it is impossible to tell them from tumours except by exploratory thoracotomy (Wood). An infected eyst will simulate an abscess both clinically and roentgenologically and in such cases the use of the bronchoscope, of x-ray after iodized oil, or the observance of the subsequent course of the disease may be necessary in order adequately to distinguish them. The shadow cast by the fluid-containing cyst is circular or rectangular whereas that cast by an empyema is more triangular and has its base at the thoracic wall. Echinococcus cysts will give a positive complement-fixation reaction and clinically there is urticaria and eosinophilia. Such cysts are mediastinal in origin and cause little or no dyspnæa. The characteristic hooklets may be found in the sputum. Unless teeth, bone or cartilage appear on the x-ray film, it may be impossible to distinguish a dermoid cyst.

If the cysts are air-containing, the differential diagnosis becomes still another problem, The physical examination is of little or no use. large balloon-type cysts both the physical examination and the skiagram may suggest a pneumothorax. The skiagram in pneumothorax, however, will show the well-defined border of the collapsed lung which is not seen in the film of a cyst. If the cyst communicates with a bronchus iodized oil should outline its borders. or, if it does not, an induced pneumothorax followed by x-ray will usually distinguish it. An infected honey-comb lung will closely simulate bronchiectasis, but here bronchoscopy and iodized-oil instillation followed by x-ray will usually readily differentiate the two conditions.

Not infrequently the x-ray will show an extensive lesion when the patient appears to be quite comfortable and with surprisingly few symptoms. Schenck feels that this is an important point to

remember in the differential diagnosis.

The inflammatory lesions usually offer, less difficulty, particularly if they are acute or subacute in nature. Pneumonia offers no problem at all. An encapsulated empyema will have a history of a recent acute infection and a septic The x-ray will show a localized pocket fever. of fluid. If this is interlobar, the shadow will be wedge-shaped and will extend along the situation of the interlobar fissure. Lung abscesses can usually be diagnosed by their previous history, their course, and the poorlydefined margins of the lesion on x-ray, because of the surrounding pneumonitis.

The solitary non-expansile cyst appears as an inter-pulmonary globular or spherical pocket of air that often shows increased illumination on deep inspiration under the fluoroscope. It must be differentiated from an emphysematous bulla which would have no delimiting wall, from a localized or partial pneumothorax which would be outside the lung parenchyma, would be more irregular in contour and would show no increased illumination on deep inspiration, and from a tuberculous cavity which would show dense broader walls, concomitant pulmonary infiltration and other changes that accompany this disease. Nevertheless many cases of solitary cysts have received anti-tuberculosis treatment

by mistake.

The expansile or balloon-type cyst causes increasing symptoms of dyspnæa and cyanosis. The x-ray picture may closely simulate that of a complete pneumothorax and differentiation may be quite difficult. There may be some haziness at the apex and obliteration of the costo-phrenic angle because of atelectasis. The hilar shadow may be narrow and elongated, and there may be a broad stump at the lung root as in pneumothorax. It may be necessary to induce pneumothorax so that the outer border of the lung and the wall of the cyst might be refracted from off the chest wall and then to x-ray in order to separate the two conditions, diagnostically. The clinical picture in the two conditions may be approximately or identically the same.

Multiple air cysts show up in the skiagram as sharply-defined spherical cavities, discrete, irregularly arranged and with a lack of infiltration in the pulmonary tissue between them. Clinical signs may be few or none at all. Bronchiectasis may be confused with this condition, but this usually follows a severe infection and the skiagram will show secondary changes in the pulmonary tissue between the cavities. The cysts may give a history of more or less mild symp-

toms since birth.

The differentiation of diaphragmatic hernia and eventration of the diaphragm from these conditions is suggested by the absence of gurgling sounds, and is accomplished by the barium

meal followed by x-ray examinations.

The prognosis in congenital cystic disease is, on the whole, not good. The condition is not compatible with long life and, according to Schenck (1937), the mortality is high among children, especially with the expansile type. The greatest potential danger is from secondary infection. If no bronchial communication exists, the patient is safer and the condition is less likely to progress.

The only rational treatment is surgical extirpation or lobectomy in selected cases. With improved technique the mortality rate from this procedure is decreasing and the operation is becoming more feasible. Wood (loc. cit.) claims that, in infected cases, bronchoscopic aspiration followed by the injection of iodized oil has produced marked subjective improvement. If the intra-thoracic pressure is increasing, repeated aspirations or the institution of permanent thoracic drainage may become necessary to save the patient's life. Aspiration will confer no benefit unless there is this increasing pressure. At times symptoms may subside spontaneously, presumably either because the cysto-bronchial communication has become blocked completely or has become quite free, the valve-like action in either case being abolished.

Case report.—Male, aged 17, a schoolboy, was admitted to the wards of the Miraj Medical Centre on 10th November, 1938. He complained of dyspnæa which was more marked on exertion, and of a chronic cough which was accompanied by small amounts of sputum. As far as he knew, these symptoms had been present all his life and were worse during the rainy season. He had never had an attack suggestive of true asthma nor did he ever feel uncomfortable because frue asthma nor did he ever feet uncomfortable because of his symptoms. Two months prior to admission he had had a small hemoptysis and, because of this, a diagnosis of tuberculosis of the lungs had been made. He was referred to the Wanless Tuberculosis Sanatorium where the diagnosis could not be confirmed. He was therefore sent to the Miraj Medical Centre for further study. for further study.

His family history was essentially negative. Beyond admitting smallpox four years previously, the patient denied any preceding illness, including the usual ones of childhood. The boy was an orphan since early childhood, his parents having died of causes unknown. He had neither brothers nor sisters.

Physical examination revealed a well-developed and well-nourished boy of 17 lying quietly in bed and not obviously ill. He weighed 68 lb. The head was normal. The ears contained inspissated wax which was subsequently removed. The nose and throat were quite clear of anything pathological. The tonsils, teeth and gums were all healthy. The tongue was clean. The thyroid was not palpable. The anterior and posterior cervical glands were palpable and there was one large gland the size of the tip of the little finger in the centre of the right posterior triangle. Other smaller glands were palpable above the middle third of the right clavicle. The cardiac impulse was localized at the apex, which was situated in the fifth intercostal space, well within the left nipple line. The cardiac country was the second intercostal space, well within the left nipple line. The cardiac sounds were clear and forceful and the second pulmonic was accentuated. There were neither thrils nor murmurs. The thoracic cage was sthenic in type and moved freely on respiration. The lungs showed increased resonance throughout both sides, anteriorly and posteriorly. The breath sounds were harsh and the expiratory murmur was prolonged. There were many course and medium râles and rhonchi throughout both lungs. Vocal and tactile tremitus were both diminished. The abdomen, liver and spleen showed nothing remarkable. The neurological signs were also normal as well as the skin, locomotor system and the peripheral arteries. The temperature was 98°F. and did not vary during his stay in the hospital. The pulse rate was 80 and the respirations were 22. pulse rate was 80 and the respirations were 22

Neither the urine nor stool showed anything abnormal. The blood picture was as follows:

Red blood cells Hæmoglobin			4,110,000	per cent.
Tamoglobin				
White blood cells	Mary State		14,000	cent.
Polymorphonuclears			63	per cent.
Lymphocytes		••	35	17
Monado	• •	• •	1	11
Monocytes			1	
Eosinophils				"

The sputum was repeatedly negative for tuberdle bacilli but it was thick and foul and contained many leucocytes. Old tuberculin, 0.1 mgm., intracutaneously failed to give any reaction. The sedimentation rate of erythrocytes was 19 mm. in one hour, the method being used (normal rate 0-10 mm.).

The x-ray (figure 1) showed many annular shadows scattered through the middle and lower areas of both scattered through the middle and lower areas lungs. These were close to the hila above but farther

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out below. In the left hilar region one showed a fluid level and the suggestion of inflammatory thickening of the walls. There was a row of blebs down the left

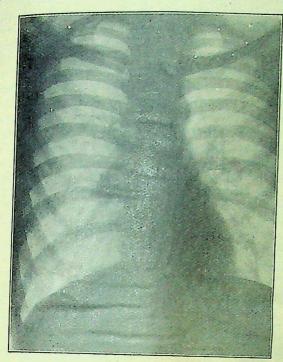


Fig. 1.

border of the cardiac shadow. After intratracheal instillation of iodized oil into the left base (figure 2),

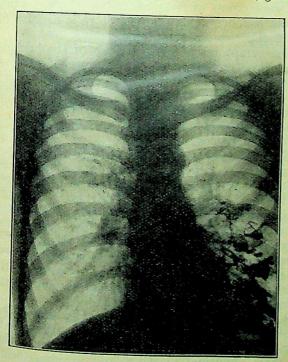


Fig. 2.

These visites of the cysts became even more apparent.

These pictures were considered as typical of congenital cystic disease of the lung.

Because of the mildness of the symptoms, no treatment beyond postural drainage and attention to the general nutrition was recommended, and the patient was discharged to one of the out-dispensaries for was discharged to one of the out-dispensaries for further observation and follow-up.

(Continued at foot of next column)

# UTERINE RETROVERSION

A COMMENTARY ON THE INDICATIONS FOR THE OPERATIVE CORRECTION OF RETROVERSION OF THE UTERUS, UNACCOMPANIED BY PROLAPSE-ILLUS-TRATED BY SIX CASES

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District Medical Officer and Superintendent, Govern-ment Headquarters Hospital, Bellary

It is well known that retroversion of the uterus can be present without causing any symptoms or signs by its abnormal position.

Theilhaber (1885) was the first to state that uncomplicated displacement of the uterus need cause no symptoms. Others-amongst them Curtis, C. Jeff Miller, Lynch and Crossen, quoted by A. H. Curtis (1933)-hold that retroversion, if long continued, will cause pathological changes in the pelvis. This will give rise to definite signs and symptoms which are characteristic of the condition.

The woman in whom the retroversion is due to hypoplasia of the uterus rarely has symptoms due to the retroversion.

The woman in whom the retroversion is directly attributable to childbirth will generally have symptoms due to the retroversion. The symptoms tend to be slow in onset and gradual in development.

Thirdly, there is the woman with a retroversion accompanied by other pathological conditions present in the pelvis-inflammatory or neoplastic. This woman will have symptoms chiefly referable to the associated conditions and only partly to the presence of the retroversion.

Examinations have shown that—

(a) 20 per cent of women have the uterus directed backwards without having had any

#### (Continued from previous column)

#### Summary

The literature on congenital cystic disease of the lung is reviewed, and a case is reported.

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symptoms attributable to the displacement, as stated by Kerr, Ferguson, Young and Henry (1933).

(b) many women who complain of certain symptoms commonly associated with gynæcological conditions and who are found on examination to have the uterus directed backwards, when the position is corrected this group of patients still complains of their original symptoms.

In spite of the uterus being retroverted, we frequently see many women who, besides not complaining of any symptoms, carry out normally the functions of their pelvic organs. Thus menstruation may be normal in periodicity, amount, and duration, with very little menstrual pain. Pregnancy can, and often does, occur in the retroverted uterus and proceeds normally to

Anatomically, the uterus may be simply retroverted in position and all the other internal genital organs are normal in position and

appearance.

Commonly, however, especially in acquired variety of retroversion, the ovaries show some degree of prolapse into the pouch of Douglas. This may cause the broad ligaments to become folded over the utero-sacral ligaments, and in consequence results in pressure being exerted on the walls of the ovarian veins and veins of the pampiniform plexus, Clare (1933). Thus a broad ligament varix may result which exerts an influence on the function of menstruation and ovulation, and in addition is capable of causing persistent dull pelvic pain which may make a patient feel ill, particularly after being on the feet for a long time.

Graafian follicles under these conditions tend to be ædematous and persistent, and the uterine endometrium to be congested and thickened, Eden and Lockyer (1935).

Ovulation is irregular and this influences the endometrium with the result that irregular and profuse uterine bleeding may occur.

The other common anatomical modification with retroversion is uterine descent, but this does not concern us here and will not be discussed further.

In a great number of cases the following main symptoms, in greater or lesser degree, are

(1) Pain in the lower abdomen and back.

- (2) Menorrhagia, metrostaxis, menorrhalgia, and leucorrhœa.
  - (3) Dyspareunia.

(4) Sterility.

There is no symptom-complex which is diagnostic of the condition of retroversion of the uterus. The symptoms already given may correctly fit any other gynæcological condition.

Pain.—This is usually of a dull, aching character and is usually most marked when the ovaries are prolapsed. It may occur as a dragging sensation in one or both iliac regions.

Backache is common. It is lumbo-sacral in position. Naturally, backache is not distinctive of retroversion. Its causes are many, but Lynch (1926) found backache in 50 per cent of patients with retroverted uterus and was able to relieve it in 81 per cent by suspension operations, Bullard (1921) reported that in 103 out of 129 cases, i.e., 80 per cent, backache was relieved by suspension operations for uncomplicated retroversion of the uterus.

Graves (1923), in an analysis of 500 cases of retroversion from all causes, states that lumbosacral backache was a definite symptom in 76

per cent.

Sturmdorf (1931) states that, in his opinion. the displacement is not the cause of the backache. He argues that the cause of the displacement is the cause of the backache. This hardly agrees with Bullard's findings or with those of Lynch (loc. cit.). Their results argue a possible indication for operative treatment.

The backache is said to be caused by traction on the utero-sacral ligaments. It is aggravated by prolonged activity and by menstruation, but

is relieved by rest.

2. Menorrhagia, metrostaxis, menorrhalgia, and leucorrhæa.—These are common symptoms and are due to the altered state of the endometrium. Owing to the cedema and persistence of Graafian follicles, reputed to be due to a prolapse of the ovaries, the endometrial condition has some points of resemblance to that of metropathia hæmorrhagica and therefore is capable of producing similar symptoms.

The symptoms of irregularities of the hæmorrhagic loss can occur in the absence of ovarian prolapse. If due to the retroversion they may be explained by the general congestion of the pelvic organs, secondary to the retroversion.

3. Menstrual pain.—This may be due to:

(a) Congestion.

(b) Mechanical difficulty which the uterus encounters in expelling the menstrual products.

It must be realized that a uterus fully retroverted has its fundus at a lower level than the os internum. It therefore follows that the menstrual products have to be expelled against the force of gravity. For this reason the uterine muscle is called upon to perform extra work, and, as it is often on the borderline of muscular inefficiency, muscle spasm occurs producing severe menstrual pain.

4. Dyspareunia.—This is usually caused by prolapse of the ovaries. When the latter are in the pouch of Douglas, they are congested owing to their abnormal position, and in consequence are excessively tender to the touch. The usual sensitiveness is accentuated.

Dyspareunia can occur, apart from prolapse of the ovaries. The fundus of the uterus itself can be very tender especially when fixed in the pouch of Douglas by adhesions. For this reason, coitus becomes coitus becomes to all intents and purposes impossible, and marital possible, and marital unhappiness is likely to ensue.

5. Sterility.—As has been stated before, retroversion is by no means an absolute cause of sterility, but it has often been observed that after several years of sterile marriage, the correction of the retroversion of the uterus has been followed by pregnancy.

Sharman (1932) found that in his series of

cases, 25 per cent were sterile.

Theoretically, sterility connected with uncomplicated retroversion of the uterus may be due

- (i) Alterations in the endometrial constitution which renders it an unsuitable nidus for implantation.
- (ii) Coitus in the dorsal position deposits semen in the posterior vaginal fornix, towards which the normally situated cervix points. In retroversion the cervix points forwards, away from the posterior fornix and is often applied directly to the anterior vaginal wall. The spermatozoa therefore find it difficult to reach, and entry into the cervical canal is therefore not

Huhner thinks that only those spermatozoa directly ejaculated into the canal stand a reasonable chance of fertilizing an ovum, although others like van der Velde do not believe this to

be true.

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When correction of the retroversion has been decided upon, two technical procedures are available:

(1) The operative method, designed to maintain the uterus permanently in a position of anteversion.

(2) The instrumental method in which the · uterus is kept anteverted by means of a mechanical support or pessary in the vagina.

The use of (2) is limited. It can be used with advantage in-

- (a) puerperal backward displacement. It is possible to cure permanently a retroversion of this type if the pessary be left in situ for 2 to 3 months;
- (b) those cases in which it is used as a diagnostic aid;
- (c) patients not desirous of undergoing operative treatment.

Those cases grouped under (a) and (c) above do not concern us in this commentary, but those under (b) are important as this is the group in which operation is most likely to be indicated.

One may conclude that the signs and symptoms which are indicative of operative treatment come under the following headings :-

1. Those cases where the symptoms disappear when a pessary is used, indicating that symptoms are directly referable to the retroversion. Therefore, if an anteverting operation be properly and carefully carried out, it can be confidently expected that the symptoms will be cured. In this type, of case the pessary is used as a diagnostic measure.

The only exception to this procedure is the sterile woman who has become pregnant after

the uterus has been kept anteverted by means of a pessary. Here, if the uterus be kept in an anteverted position during the ensuing puerperium, it may remain anteverted.

2. Those signs which cannot be treated by means of a pessary. These include dyspareunia

due to either-

(i) prolapsed ovaries, (ii) fixed retroversion.

Laxity of the vagina is an additional indication for operative correction.

A pessary stays with difficulty in a lax vagina, or it frequently turns sideways and renders no useful service.

3. Those cases in which the pessary fails to keep the uterus in the anteverted position.

It will be seen that the use of the pessary is a very valuable means of helping us to arrive at the decision of 'operation' or 'no operation'.
Unfortunately, in India it is a form of diag-

nosis and treatment which cannot be used to any extent for the following reasons:-

- A. People (especially the hospital classmostly coolies) move frequently from place to place. They attend hospital on one occasion and when asked to return in a week, they can rarely be induced to carry out the instruction.
- B. If the pessary cures their symptoms, they are quite content never to appear at the hospital again.
- It therefore follows that the pessary once having been introduced into such patients, never sees daylight again. The probable result is ulceration of the vagina with its common sequelæ, namely, carcinoma and general pelvic infection, which are common enough in India. Under these conditions the pessary becomes a potentially dangerous instrument and rarely can be used.

In the illustrative cases accompanying this article, the main symptoms for which operation was performed were sterility and dyspareunia.

This agrees with the reply to the inquiry sent to the senior gynæcologists at the London teaching schools, as mentioned by Luker (1934) in his article. Both these conditions, if present, play a large part in the life of the average woman, especially in India. For this reason, operative treatment—with us, Gilliam's technique—is performed as a routine if a woman complains of sterility and has a retroverted

Also, in the case of dyspareunia, operation is decided upon if the uterus be retroverted and tender on palpation, either with or without prolapsed ovaries.

All six cases are illustrative of this rule as

applied to sterility.

Cases I, III, and VI are illustrative of sterility combined with dyspareunia which constitutes a double indication for operation.

In summary, the general indications for operation in this condition are much the same as those recorded by Luker (loc. cit.) with certain special

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provisions dependent on the peculiar characteristics of the Indian mind, climate and other conditions of an economic nature.

It is regretted that no 'follow-up' report of

these cases can be included.

Most of these people can be persuaded to come into hospital only when so driven by pain and disease. Very rarely can they be induced to attend for examination when feeling well.

One hopes that, in their failure to report, it may be surmised that the operation has relieved

them of their symptoms.

I wish to thank Major-General N. M. Wilson, C.I.E., O.B.E., K.H.S., I.M.S., Surgeon-General with the Government of Madras, for permission to publish this commentary.

Case I.—Age 33 years; race Hindu; married 17 years; number of children 1, forceps delivery; number of abortions 1; last child—16 years ago; last abortion— 14 years ago

Admitted 26th July, 1937.

Present history.—Complains of pain in the back and lower abdomen for the last one year. Used to have pain on and off before this since the abortion fourteen years ago, but only occasionally. Pain has no relation to periods and the ache in the back is constant. Has no relation to food. Has no pain else-

where in the body. No dyspareunia. No frequency of micturition or dysuria. No constipation.

Periods.—Regular. 30/3 days. They have become more scanty during the last few months. Sometimes have dysman arrhyd before the period. Gassag with the has dysmenorrhoea before the period. Ceases with the flow. No leucorrhoea.

Examination.—Heart, lungs and abdomen. Nil

abnormal.

Vaginal examination.—Cervix pointing downwards and forwards. Uterus retroverted. Normal in size. Ovaries palpable at the postero-lateral angles. Normal

Urine.—1020 acid. Nil abnormal.

Hb. 75 per cent. R. B. C. 4.8 million. W. B. C. 7200.

B. P. 110/75.

30th July, 1937. Under spinal anæsthesia laparotomy performed. Abdomen opened through mid-line sub-umbilical incision. Uterus found normal in size and shape but retroverted. Both ovaries large and fibrotic—dense white in colour. Tubes healthy. Both patent. Appendix long and bound down by adhesions to the cæcum. It was kinked and swollen at the end. Appendicectomy performed and Gilliam's suspension carried out. Abdomen closed. The patient made an

uninterrupted recovery.

Remarks.—This was a case of sterility of sixteen years' duration after forceps delivery. On examination nothing abnormal could be made out to account for it, except a retroverted uterus. This sterility therefore was considered to be a definite indication for a suspenwas considered to be a definite indication for a suspension operation. Laparotomy was carried out and a Gilliam's operation done. The ovaries had a very thickened tunica albuginea and were fibrotic. This probably partly accounted for her sterility as her menstrual history indicated deficient ovarian function. The appendix showed signs of subacute and chronic inflammation and was removed. She made an uninterrupted recovery.

Case II.—Age 34 years; race European; married 11½ years; number of children 2, both normal confinements; number of abortions, nil; last child—7 years

Present history.—Complains of backache for the last five years, which is becoming worse. She also has excessive loss at the periods. No lower abdominal pain. Has dyspareunia. No dysuria or frequency of micturition. Not constipated. No leucorrhea.

Periods.—Regular. 28/5 days. Excessive loss with aching pain during period. Last period 12th January, 1938.

Examination.—Heart, lungs abdomen. Nil abnormal.

Vaginal examination.—Cervix pointing downwards and forwards. Uterus retroverted. Fornices clear. Cannot be anteverted. Tender.

Urine.—1010 acid. Nil abnormal.

Hb. 85 per cent. B. P. 110/70.

2nd February; 1938. Under spinal anæsthesia laparotomy performed. Abdomen opened through mid-line sub-umbilical incision. Uterus found retroverted and bound down by some thin adhesions. Rather red and congested. Tubes patent, and ovaries normal. Gilliam's suspension performed.

Remarks.—This was a case of sterility dyspareunia. The patient was anxious to have another child and as she also had very painful coitus plus the fact that the uterus appeared fixed, a suspension operation was considered indicated. This was done by Gilliam's technique and the patient made an uninter-

rupted recovery.

Case III.—Age 19 years; race Indian Christian; married 4 years; number of children, nil; number of abortions—2 (1, 3rd month), (2, 2nd month); date of last abortion—8 months ago.

Admitted 18th March, 1938.

Present history.—Complains of pain in the lower abdomen and backache for the last eight months. Pain is definitely worse during the period. She had backache before her last abortion but this has definitely become worse since. No constipation, no pain on defectation. No frequency or pain on micturition. Has dyspareunia.

Periods.—Regular. 28/8 days. Moderate loss. Last period 20 days ago. She has had leucorrhea since

marriage, which has become worse lately.

One year ago was admitted with dysmenorrhæa. Cervix dilated and curetted and the uterus anteverted manually, following the first abortion. She became pregnant but aborted four months after the operation.

abdomen. Nil Examination.—Heart, lungs and

Vaginal examination.—Long conical cervix pointing downwards and forwards. Uterus retroverted, normal in size. Both ovaries prolapsed and tender. Fornices otherwise clear.

Urine.—Nil abnormal.

Hb. 55 per cent.

23rd March, 1938. Under spinal anæsthesia laparotomy performed. Abdomen opened through mid-line sub-umbilical incision. Uterus found retroverted, normal in size. Both ovaries prolapsed, tubes inflated and found patent. Uterus anteverted by Gilliam's

technique, abdomen closed in layers.

26th March, 1938. Patient had reasonably comfortable night; passed urine and flatus: no vomiting, upper

abdomen rather distended, to have enema.

13th April, 1938. Discharged fit.

The patient had unexplained pyrexia for about a week, but otherwise no complications and was discharged on 13th April.

Remarks—A cost of retrespected whereas, with

Remarks.—A case of retroverted uterus, with prolapsed ovaries. The history and symptoms seem to point to the retroverted position of the uterus and prolapsed state of the overies him to be seen to be a seen of the overies him to be seen of the ov prolapsed state of the ovaries being the cause of her trouble. There was a relative sterility (two abortions) which in the class a relative sterility (two abortions) which in the absence of any other cause was attributed to the retroverted uterus. The prolapsed ovaries were causing dyspareupic and causing dyspareunia and as there seemed to be a better likelihood of her carrying a pregnancy to full term if the uterus were anteverted, the abdomen was opened and a Gilliam's operation. and a Gilliam's operation was done. She made an

uneventful recovery.

Case IV.—Age 29 12 years; number of children, nil; number of abor-

Admitted 19th July, 1937.

Present history.—Complains of pain in the lower abdomen. More on the right side. Has had it for

the last seven years on and off. No indigestion, has the last seven years on and oil. No indigestion, has flatulence. Pain not related to taking of food. Starts about ten days before the period. Pain disappears when the flow starts. No vomiting, no backache. Tends to be constipated. No pain on defæcation.

Periods.—Regular. 25/2 days. They are scanty, blacking in colour. Last period one week ago. She

has no leucorrhœa, frequency of micturition, or dysuria. She was curetted one year ago. Did not alleviate

the pain, nor did any pregnancy follow.

Examination—Heart and lungs. Nil abnormal. Abdomen.-Soft, definitely tender over MacBurney's

point. No mass palpable.

Vaginal examination.—Cervix small. Pointing downwards and forwards. Uterus retroverted, normal in size. Right ovary palpable, slightly larger than normal. No tenderness or mass palpable in the right fornix. Left fornix—ovary palpable—larger than normal.

Urine.—Nil abnormal.

Hb. 65 per cent.

B. P. 125/80.

27th July, 1937. Under spinal anæsthesia laparotomy performed. Abdomen opened through mid-line subumbilical incision. Uterus found retroverted and both ovaries cystic. Tubes normal and patent. Appendix kinked and held down by adhesions about its centre. The tip bulbous—chronically inflamed. Appendicectomy and Gilliam's suspension performed. Abdomen closed in layers.

Remarks.-A case of sterility with retroverted uterus,

cystic condition of ovaries, and chronic appendicitis.

Laparotomy was decided upon as she seemed to have definite signs of a chronic appendicitis. The uterus also was retroverted and rather fixed and as she was sterile and desired a child an anteverting operation was considered indicated. A definitely chronic inflamed appendix was removed and Gilliam's suspension done. The ovaries had small multiple unruptured follicular cysts on them. This was considered to be caused by

the retroverted position of the uterus.

There was some difficulty post-operatively with getting her bowels open and starting normal micturition.

Other than this she made an uninterrupted recovery.

Case V.—Age 27 years; race Hindu; married
12 years; number of children, nil; number of abortions,

Admitted 31st January, 1938.

Present history.—Complains of sterility. Has no backache but has had dyspareunia since marriage. Has always had dysmenorrhee which used to be at the beginning of the period only, but lately has continued throughout the period. No trouble with micturition. Not constipated

Periods.—28/4-5 days. Painful throughout. Moderate loss. Last period seven days ago. She has had white discharge for the last twelve years.

Examination.—Heart, lungs and abdomen. Nil

Vaginal examination.—Cervix pointing downwards and forwards. Os closed. Uterus retroverted, normal in size. Cannot be anteverted. Both ovaries palpable. Normal in size and prolapsed.

Urine.—No albumin. No sugar. 1020 acid.

Hb. 85 per cent. R. B. C. 3.9 million. W. B. C. 4400.

B. P. 120/80. 4th February, 1938. 9-30 a.m. Under spinal anæsthesia laparotomy performed. Abdomen opened through mid-line sub-umblical incision. Uterus found retrovented retroverted, normal in size and appearance. ovaries had numerous small cysts over them. Both tubes tested and found patent. Uterus brought forward by Gilliam's technique. Abdomen closed. Dilatation and curettage performed.

18th February, 1938. Patient discharged after satisfactory progress.

Remarks.—This was a case of a woman married for twelve years with absolute sterility.

On account of this and the dyspareunia it was decided to antevert the uterus by operative means. This was carried out. What were taken to be unruptured followed. tured follicles were found in both ovaries—due possibly to the prolapsed state of these organs. Thus it was inferred that the sterility was due to the mal-position of the uterus and the effect of this on the ovaries. She

made an uninterrupted recovery.

Case VI.—Age 37 years; race Hindu; married 30 years; number of children 3; number of abortions 1; last child 10 years ago.

Admitted 18th April, 1938.

Present history.—Complains of left-sided abdominal pain—10 months' duration. Pain is made worse by the periods, and lasts throughout the period. Pain has no relation to taking of food, but she often vomits food. No blood in the vomit. She is chronically constipated.

No pain or blood on defacation.

No pain or blood on defacation.

Periods.—Last period 10 months ago. Periods before this were irregular, usually about every fifteen—twenty-five days. Each lasted about six days. Not profuse. She has left-sided pain during the period. Leucorrhea—present. Has had this about five years, not offensive and has become more profuse lately. No pruritus pruritus.

She was in hospital last month, but left at her own request two days later, and has been having treatment for erosion in the out-patient department.

Examination.—Ill-nourished anæmic patient.

Heart, lungs and abdomen.—Nil abnormal.

Vaginal examination.—Cervix pointing downwards and forwards—erosion present—small. Uterus retroverted—larger than normal, fixed. Tender. Second degree tear of perineum.

There is some thickening felt in left fornix—tender. Urine.—No sugar or albumin. No deposits or pus

cells.

Hb. 60 per cent.

B. P. 115/85.

23rd April, 1938. Under spinal anæsthesia subumbilical mid-line incision made. Great omentum
adherent by a long band to fundus of the bladder.
This band was divided and removed. Uterus was
retroverted, larger than normal and fixed by adhesions to the rectum and pouch of Douglas. Left ovary was non-existent except for a small cyst, the size of a hazel-nut. The distal half of the left tube was also non-existent. The proximal half seemed to be merged into the round ligament and the top of the broad ligament. The right tube and ovary were normal. Left ovarian cyst resected. The uterus was freed from its adhesions and Gilliam's method of suspension its adhesions and Gilliam's method of suspension performed. The appendix was found tightly bound down by adhesions and kinked. Appendicectomy performed, abdomen closed in layers.

The perineal tear was repaired by a posterior

colpo-perineorraphy.
7th May, 1938. Patient discharged fit. Temperature normal, wound healed.

Remarks.-This was a case of a woman with leftabdominal pain, irregular periods,

As her uterus was fixed and tender and there was diffuse thickening present in the left fornix, the symptoms were ascribed to a chronic inflammatory state of

the pelvis causing adhesions.

A laparotomy was decided upon with a view to freeing the pelvic organs. The findings at operation were in agreement with the pre-operative diagnosis. She had all the late results of a healed general pelvic inflammation plus signs of old trouble in her appendix inflammation plus signs of old trouble in her appendix. The uterus was freed and anteverted by operation, the cystic left ovary removed and appendicectomy performed. She made an uninterrupted recovery.

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THE RELATION OF LIVER TO OTHER DISEASES WITH SPECIAL REFERENCE TO GASTRO-INTESTINAL DISORDERS TREATMENT WITH AND THEIR INTRAVENOUS CALCIUM

By I. BAKHSH, M.D. (Lond.), M.R.C.P. (Lond.) MAJOR, I.M.S.

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THERE is no other organ in the body which possesses so many functions as the liver. It is only recently we have begun to understand more about the functions of this important organ and even at the present stage of our knowledge we know very little. In the Unani and Ayurvedic systems of medicine the liver is believed to play a very important part in the ætiology of various diseases. It is not an uncommon experience to find the liver being blamed by physicians of indigenous systems for almost any ailment that a human being is liable to suffer from. The Hakims have believed for centuries that the liver plays an important rôle in the causation of gastro-intestinal disturbances, diabetes, anæmia, gout, asthma, hæmorrhagic diathesis, nephritis and œdema.

These conceptions of the functions of the liver have been based on the traditional belief and careful clinical observations of the old Hakims, although they possessed no diagnostic tests to help them. Recent advances in our knowledge of the physiology and pathology of the liver have made us respect these conceptions. It is beyond doubt that the liver plays an important rôle in gastro-intestinal disorders, pernicious anæmia and diabetes mellitus. Since the work of Heyd in 1924 on the relation of liver to kidney disease, a good deal of work has been done on the hepato-renal syndrome. Although the exact mechanism by which disorders of the liver cause kidney symptoms is not known, it is abundantly clear that some deaths from renal failure may actually be due to liver disease.

Girbal (1936) claims that in all asthmatic cases, if systematic search is made, signs of hepatic insufficiency can be found. He reports favourable results with liver extracts and

cholagogues in such cases. Chrometzka (1936) has shown in animals that disturbance of purine metabolism can be produced by damaging the liver, with the result that the animal gradually loses the capacity to oxidize uric acid. He believes that similar mechanism may be responsible for gout in man, thus blaming the liver for another metabolic disorder the pathogenesis of which still remains a controversial point.

As the presence of bile in the intestines is necessary for the absorption of many fatsoluble vitamins as well as calcium, it is easy to understand the importance of liver disease in the causation of many functional and metabolic disorders due to avitaminosis and hypocalcæmia.

More recently it has been shown that liver disease causes a lowering of the prothrombin level of the blood and thus plays a very important rôle in the production of hæmorrhage, Hawkins and Brinkhous (1936), in studying the hæmorrhagic state induced by complete biliary fistula in dogs, have noted a deficiency of prothrombin and showed that it could be corrected by the administration of bile. It is likely that the hæmorrhagic state associated with liver disease is attributable to failure of absorption or utilization of some substance normally present in the diet which requires bile for its assimilation. This substance may be the hypothetical coagulation vitamin K, for Dam and his coworkers have shown that chicks fed on a diet deficient in this vitamin developed hæmorrhages in various parts of the body and this bleeding was associated with a decrease in the concentration of prothrombin of the blood. Clinical experiments with vitamin K, and bile salts by mouth in human subjects suffering from hæmorrhages seem to confirm the findings of Dam and his co-workers.

### The rôle of the liver in gastro-intestinal disorders

One of the oldest known functions of the liver is its rôle in digestion. The presence of bile in the intestines is necessary for the digestion and absorption of fats and fat-soluble substances. In obstructive jaundice the appearance of gastrointestinal disturbances needs no explanation. But the symptoms of furred tongue, lack of appetite, gaseous distension of the stomach and intestines and irregularity of the bowels in cases of mild hepatitis without any apparent decrease in the production or flow of bile is difficult to explain. Whether these symptoms are due to insufficiency or poor quality of bile or to some other factor is not clear. The frequency of gastro-intestinal disturbances associated with minor disorders of the liver appears to be much more common than is realized. Careful observation of such cases has convinced the writer that these symptoms have little to do with cholecystitis with or without stones, for none of these cases has shown any definite symptoms of

(Continued from previous page)

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gall-bladder disease. Besides, the therapeutic measures which have proved successful in the majority of such cases have been directed mainly towards the improvement of liver function.

Furthermore the reasons for attributing these gastro-intestinal disorders to liver dysfunction are enlargement and tenderness of this organ and the disappearance of the gastro-intestinal symptoms as the liver recedes back to its normal

size.

I have not been much impressed with the liver function tests which are often negative even when there is definite enlargement and tenderness of the liver. There is no reliable single test which can help in the diagnosis of minor grades of liver disorders. In fact animal experiments have shown that most of the commonly used tests remain negative even when more than 80 per cent of the liver is removed. Hurst (1937) believes that the lævulose test is perhaps the most valuable liver function test while in America the bromsulphthalein test is considered to be more reliable in the absence of jaundice. In my own limited experience the lævulose test has more often given me information about liver disease when all other tests such as bromsulphthalein test, Takata-Ara test, icterus index, van den Bergh reaction and urobilin in the urine have been negative.

As a matter of fact there is no point in performing elaborate liver function tests where the organ is enlarged and tender, for in all probability the liver is not normal in the majority of such cases. In those cases, however, where the liver is not enlarged or tender, liver function tests, if positive, are of great diagnostic value, but if negative they do not exclude the possibility of liver disease. Case 9 described later is of particular interest as the liver was neither enlarged nor tender but the lævulose test was positive when all the other tests were normal. As the case improved with calcium therapy the

lævulose test also became normal.

The majority of such cases belonged to a better class or at least those who could afford to indulge in overeating, especially of meat and fatty and highly seasoned food. Alcohol did not play any significant rôle in the present series of cases, in fact most of these patients took no alcohol. Repeated pregnancies and prolonged lactation were additional factors in women, as they helped to drain the calcium of the body and also to the fact that some form of hepatic damage during pregnancy is not uncommon in this country.

The main symptoms complained of were lack of appetite, dyspepsia, wind in the stomach and intestines, constipation and sometimes diarrhea, and general debility. Their history disclosed a varying period, from one to many years, of wandering from one consulting room to another but without much benefit. One case had been suffering for the last 7 years and had tried all kinds of treatment without any improvement.

Physical examination of these cases showed a pale complexion without jaundice or anæmia, furred tongue, and enlargement and tenderness of the liver. In the majority of the cases the liver was enlarged by one to two fingers but it was not rare to find a liver enlarged by 4 to 5 fingers. Some of the cases had low pyrexia especially when the liver was much enlarged. The most important physical sign was furred tongue. I have not come across a single case of hepatic indigestion with a clean tongue.

The hepatic syndrome has to be differentiated from other causes of liver enlargement, especially cardiac failure, amœbic and syphilitic hepatitis, gall bladder disease. The only condition which simulates this syndrome closely is active congestion of the liver of the tropics, but the absence of alcohol and long history are against such a diagnosis. When the liver is much enlarged in middle-aged or elderly patients the condition has been often diagnosed as cancer of the liver.

## Therapeutics of liver disorders

The chief remedies prescribed in such cases are laxatives, bismuth, alkalis, carminatives, strychnine and other bitters, hydrochloric acid, takadiastase, pepsin, kaolin, charcoal and very rarely bile salts. It is apparent therefore that the failure to get any substantial relief from such therapeutic agents is due to the fact that the primary cause does not lie in the stomach, intestines or gall bladder, for which the above drugs are prescribed.

The therapeutics of liver dysfunction and disease, when not due to any specific cause such as cardiac failure, syphilitic or amæbic infection, are not clear. Among the many drugs which have been advocated, and without much pharmacological basis, are calomel and other so-called cholagogues, ammonium chloride, salicylates, etc. Hexamine is used when there is co-existing cholecystitis, while bile salts, magnesium sulphate, olive oil and more recently nitrites are employed, when bile does not reach the intestines in sufficient quantities due either to insufficient production or as a result of stagnation in the biliary passages from spasm of the common bile duct.

The experiments of Mann, Bollmann and their co-workers have shown that the fatal toxemia that follows the administration of hepatotoxic agents to dogs is greatly minimized by the prophylactic administration of diets containing large amounts of carbohydrates. Animals which were given high meat or high fat diet died very quickly. The experimental evidence is, therefore, greatly in favour of giving low fat and meat, and high carbohydrate diet to patients suffering from liver disease and in urgent cases large doses of glucose (200 gm.) have been given intravenously with considerable success.

In addition to the above drugs calcium has been recommended as a prophylactic against liver injury sometimes caused by carbon tetrachloride. In 1928 Lamson, Minot and Robbins discovered that calcium deficiency increased the liability to toxic degenerative changes in the liver by carbon tetrachloride. They found that dogs which were given high calcium diet succumbed less readily to the toxic action of carbon tetrachloride on the liver than the dogs on low calcium diet. -It occurred to me that as calcium prevents the toxic action of carbon tetrachloride on the liver it might be useful in the treatment of other liver diseases. The results obtained have been most gratifying in the majority of cases while partial relief has been obtained in others. A recent personal communication with Drs. Bollmann and Snell of the Mayo Foundation, Rochester, U. S. A., shows that these workers have also used calcium gluconate in acute necrosis of the liver, but the results were not very promising. They, however, admit that they have not given calcium a fair trial and besides they were concerned mainly with experimental acute necrosis in animals.

The exact way in which calcium acts is not clear. Lamson, Minot and Robbins have put forward an hypothesis that the acute symptoms of calcium lack, such as characteristic tetany, tremors, convulsions and a great tendency towards hæmorrhage which follow carbon tetrachloride poisoning in dogs, are due to inactiva-tion of the ionized calcium by its conversion into a complex un-ionized molecule with bilirubin, which circulates in large quantities after hepatic damage. While this hypothesis explains the symptoms of calcium lack it does not throw any light on the exact mechanism by which calcium prevents the toxic action of carbon tetrachloride

In the present series calcium was given in the form of calcium gluconate, 10 per cent solution in doses of 10 c.cm. intravenously, every day for 5 to 15 days. If it did not cause any reduction in the size of the liver nor any amelioration in the symptoms within 10 days it was given up. No calcium preparation was given by mouth on account of its constipating effect and also because calcium absorption from the alimentary canal is very uncertain.

The diet was strictly restricted as regards meat and fats while carbohydrates and fruits were encouraged. This regime was not liked by most individuals and there was consequently some loss of weight in the beginning. Lately I have allowed these patients more liberal diet, especially skimmed milk, curd and about half to one ounce of butter per day for cooking purposes.

So far 25 cases have been treated on these lines with complete success in 17, partial in 6 and failure in 2. Both the cases which calcium failed to relieve as regards their main complaints it had a decided effect on the liver, which was reduced in size and tenderness by more than

fifty per cent. A record of 9 typical cases is given below :-

#### Illustrative cases

Case 1.-Mrs. C. D., aged 45, was referred to me in February 1938, suffering from anorexia, jaundice and fever with enlargement of liver of 2½ months' duration. fever with enlargement of liver of 2½ months' duration. She had been treated with purgatives, emetine injections, carbarsone and liver extract by mouth without any improvement and finally was diagnosed to be suffering from cancer of the liver. For the last fortnight her jaundice had become a little less and the pain in the right hypochondrium was also somewhat diminished. Physical examination showed her to be considerably emaciated, with moderate jaundice and cedema of the feet. Tongue was thickly furred and liver enlarged by three fingers and tender but soft and smooth on deep palpation. There was slight anæmia of a microcytic type. Examination of other systems did not reveal any abnormality. The stools and urine were normal except that the latter contained and urine were normal except that the latter contained bile. Bile pigment was not absent from the stools. Temperature chart showed low grade fever ranging from 99.5° to 100°F., very rarely reaching 101°F. in the

The fact that the jaundice was not progressive and that the dull and aching pain in the liver area had somewhat decreased lately made me rule out the possibility of malignant disease. With a history of sufficient anti-amedic treatment proving ineffective a diagnosis of simple hepatitis was made and treatment commenced with parenteral calcium gluconate, large doses of glucose by mouth and meat- and fat-free diet. doses of glucose by mouth and meat- and fat-free diet. In the beginning ten units of insulin were given once daily for a week but later it was given up. She made slow but definite improvement, and after 20 injections of calcium gluconate given during five weeks her jaundice disappeared completely and the liver was only one finger enlarged. She was still suffering from some pyrexia, the maximum being 99.5°F., but another course of five injections of calcium gluconate brought her temperature down to normal. When seen six months later she had put on 21 pounds in weight, had a clean tongue and the liver was only just palpable on deep inspiration.

Case 2.—Mr. C., aged 82, was admitted into the Albert Victor Hospital, Lahore, in August 1938, with pain in the right hypochondrium, anorexia, fever of two months' duration and enlarged liver. He looked emaciated and the tongue was furred, the liver was no intendiced by four fingers and tender but there was no

emaciated and the tongue was furred, the liver was enlarged by four fingers and tender but there was no jaundice. The temperature ranged from normal or 99°F. in the morning to 101-102°F. in the evening. Leucocytes 11,800. Differential count: polymorphonuclears 76 per cent, lymphocytes 20 per cent, large mononuclears 3 per cent and eosinophiles 1 per cent. Red corpuscles 3,500,000. Hæmoglobin 65 per cent. van den Bergh test negative. Stool free of helminthic ova and protozoal cysts. Urine contained traces of albumin but otherwise normal and did not contain any bile pigment. Other systems were normal. The bile pigment. Other systems were normal. The general look of the patient, his age and marked enlargement of the liver suggested malignant disease, in fact he was sent to the hospital for this reason as all him usual forms of treatment had failed to improve In spite of this possibility calcium therapy cent commenced. He was given 10 c.cm. of 10 per calcium gluconate intravenously daily. After two injections the tongue looked cleaner, the liver was definitely tions the tongue looked cleaner, the liver was definitely reduced by one finger and the reduced by one finger and was not so tender and the temperature was also lower. On the 9th day the temperature remained normal throughout the day, just tongue was perfectly clean and the liver was only just temperature remained normal throughout the day the tongue was perfectly clean and the liver was only just palpable on deep inspiration. He was discharged on the 13th day. Enquiries made two months after his discharge showed that he was perfectly fit.

Case 3.—Mr. C. H. M., aged 40, was admitted with a Albert Victor Hospital, Lahore, in August 1938, with history of ten days' fever. Physical examination showed no abnormality except a dirty tongue and two fingers and enlargement of the liver, which was also tender

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pressure. He looked pale but not jaundiced and the bowels were confined. Blood smears were negative for malarial parasites and the various laboratory tests for enteric group of fevers were also negative. Stools and urine were normal on microscopical as well as on cultural examination. He was given calomel and saline and diaphoretic mixture but without any improvement.

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On the 4th day after admission calcium injections were commenced, with the usual dietary restrictions. The temperature became normal after the second injection, the tongue was less dirty and the liver was reduced by one finger. Three more injections of calcium gluconate brought the liver to its normal size and the patient regained his normal appetite whereas before he hated the sight of food. He was particularly pleased about his tongue which used to remain dirty ever since he came to India. When seen eight months later he was perfectly fit.

Case 4.—Mr. J. R., aged 35, was first seen by me in August 1938, for pain in the epigastrium, indigestion, loss of appetite and constipation of one year's duration. He looked a pale, thin and weak individual. The tongue was thickly coated and liver was tender and enlarged by three fingers. There was no jaundice and the stools and urine were normal. He had had mild pyrexia on and off for the last few months. Other systems were normal. He had been diagnosed and treated for abdominal tuberculosis but without any benefit.

He was put on meat-free, low fat and high carbohydrate diet and was given calcium gluconate in doses of 10 c.cm. of a 10 per cent solution daily. Improvement was prompt, the tongue cleared up within four days, the appetite returned, pain in the epigastrium disappeared and the liver became smaller. He was advised four more injections and was told to continue with his diet for another month. Seen four months later he looked very fit, was no longer pale and the liver was not palpable. He had gained nine pounds in weight.

Case 5.—Mr. S. R., aged 38, was treated by me in the Mayo Hospital for chronic amæbic dysentery with emetine bismuth iodide in July 1937. He had improved a good deal but came again in October 1937, with a relapse. His stools, however, were now negative for any Entamæba histolytica cysts. He was given a course of carbarsone but without any improvement. Examination of his gastric contents after alcohol test meal showed hypochlorhydria and he was advised vitamin B<sub>1</sub> injections and hydrochloric acid by mouth. When seen again in October 1938, he was still complaining of indigestion and irregularity of the bowels. Examination of stools again did not show any Entamæba histolytica cysts but now the stools contained Giardia cysts. He was given a course of atebrin 0.1 gm. b.d. for one week and further examination of the stools did not show any Giardia cysts but his symptoms remained the same. He was placed on calcium gluconate therapy as his liver was found to be tender and one finger enlarged and the tongue was coated. After five injections his liver was only just palpable and not tender but his tongue remained furred and the symptoms of indigestion and wind in the abdomen remained uninfluenced. He was given another course of five injections of calcium together with vitamin B<sub>1</sub> in 10 mgm. doses parenterally, and potassium bromide gr. 5 with luminal gr. ½ twice daily after meals but without any benefit. This case offered an unusually difficult problem for all treatments had failed to relieve him although calcium was effective in reducing the hepatic enlargement.

Case 6.—Mr. M. B., aged 40, consulted me in October 1938 for attacks of giddiness, sensation of heaviness in the frontal and malar regions, lack of appetite, distension of the abdomen after meals and constipation with alternating diarrhea of four years' duration. He had consulted various physicians and Hakims and had swallowed many medicines and concoctions during the last four years. Examination showed a sallow-looking man of average build with a furred tongue, and tender and enlarged liver (2½ fingers).

Other systems were normal and there was no pyrexia. He was placed on the usual high carbohydrate low protein and fat diet and was given calcium gluconate in 10 c.cm. doses daily. When seen five days later the liver was only one finger enlarged, the tongue was cleaner but the appetite had not improved much. He was advised another course of five calcium injections together with vitamin B<sub>1</sub> in 10 mgm. daily doses parenterally. When seen a week later he looked very cheerful, the tongue was clean and the liver was only just palpable on deep inspiration. He was particularly pleased with his appetite and began to enjoy his meal as he had not done for years. He, however, felt a little weak and was therefore allowed a little meat, and the fats were increased. When seen one month later he said he felt much better although 5 to 10 per cent of his trouble was still there. He was given another course of calcium and vitamin B<sub>1</sub> injections but without further improvement. When seen six months later he was still keeping fit and was not taking any medicine.

In this case vitamin B<sub>1</sub> must have been responsible for the increased appetite but it is likely that the reduction in the size of the liver was due more to calcium than vitamin B<sub>1</sub>. Failure to cure him completely was perhaps due to structural changes in his gastro-intestinal tract and some fibrotic change in the liver.

Case 7.—Mrs. K. K., aged 45, consulted me on 15th March, 1939, for low grade fever, anorexia and insomnia of one month's duration. Two years earlier she had bilateral pleurisy, ascites, cedema of the feet and high fever for which she was treated in hospital for nine months. She made a good recovery but after discharge from the hospital she continued to feel weak and had low fever for nearly three months. For the last year she was without fever and was feeling quite well until one month earlier when owing to domestic worries she lost her appetite and developed fever again.

She was a thin and pale-looking woman with a worried lock. The tongue was furred and the liver enlarged by two fingers and tender on pressure. Spleen was also enlarged by one finger and hard, suggesting a chronic enlargement. Examination of other systems including stools and urine did not reveal any abnormality, except that the blood pressure was of low tension (110-80). Given calcium gluconate intravenously and after the second injection the liver was much less tender and only one finger enlarged. The tongue was still furred and the bowels which were regular became constipated. The fever was less and the pulse was better. She also slept well for the last two nights. After the 4th injection she developed high fever and felf drowsy all that afternoon and night. The temperature came down next day and she felt much better, the appetite was greatly improved, the tongue was cleaner, the liver was one finger enlarged and was only slightly tender on deep pressure. Two more injections of calcium gluconate further reduced her liver but the second injection gave her high fever again. Next day she contracted bacillary dysentery and the treatment was stopped. After ten days' absence she turned up again and was given a course of five more injections of calcium gluconate. This improved her greatly. When examined on 25th April, 1939, the tongue was clean, liver just palpable on deep inspiration and not at all tender, the appetite was normal, sleep good. She was no longer pale and had no fever since she stopped calcium injections. She was given more liberal diet and when seen three weeks later was quite well and free from all symptoms.

Case 8.—Mrs. M. D., aged 44, was referred to me in October 1938, for attacks of pain in the right hypochondrium radiating to the back, dyspepsia, eructations, excessive salivation and anorexia of seven years duration. For the last year the symptoms had become worse and in spite of various forms of treatment she was no better. Examination showed pale complexion without jaundice, furred tongue with tender and enlarged liver (two fingers). The liver was more tender near the gall bladder region. She was given large

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doses of hexamine and alkalis with tincture belladonna but it did not give her more than 20 per cent relief. She took these medicines for six weeks without further improvement. She was then given 5 per cent of calcium chloride in 20 c.cm. doses intravenously for four days but without much benefit although examination of the liver showed definite reduction in size (one finger) and tenderness on deep pressure. The last injection gave her considerable pain in the arm and she discontinued the treatment for about four months. She came again in March 1919, and was given intravenously 50 per cent glucose in 50 c.cm. doses daily instead of calcium. After five injections she felt considerable relief and the attacks of pain became less severe. She was given five more injections of glucose during the next ten days. After this the tongue became clean, the liver was no longer tender nor enlarged, complexion became normal and she felt very cheerful.

The attacks of pain in the hypochondrium and the back were much less frequent and severe. She was advised to take one tablet of nitroglycerine, gr. 1/100 to be sucked when the attack came. After two months she was still feeling very well and did not complain of any trouble. Seen on 4th January, 1940, she was still bearing fit without any medicine. keeping fit without any medicine.

This case probably had cholecystitis in addition to hepatitis. It is difficult to say whether more injections of calcium would have improved her as much as glucose.

Case 9.—Mr. M. A., aged 29, a medical man, consulted me on 8th May, 1939, for general weakness, loss of weight and anorexia since January 1939, when he developed an attack of catarrhal jaundice. The jaundice. jaundice which was unaccompanied by fever or enlargement of liver persisted for two months despite all treatment and then gradually diminished and disappeared completely by the beginning of April 1939. Previous to this he had suffered in 1927 from enlarged liver (one finest) integraler size of temperature and liver (one finger), irregular rise of temperature and loss of weight. The diagnosis was hepatitis and the treatment consisted of the use of mild purgatives such as sodium phosphate and small doses of magnesium sulphate, podophyllin and euonymin and restricted diet. The disease lasted for six months but the patient continued to take these medicines for several years, as whenever he gave them up he lost his apportion and whenever he gave them up he lost his appetite and

weight.

Physical examination showed no abnormality except a pale and lean individual with furred tongue. The liver was not palpable and there was no jaundice. In view of the history of hepatitis and a recent attack of jaundice it was decided to perform the liver function tests, especially as the liver was neither enlarged nor

tender on deep pressure.

Bromsulphthalein test-Negative. Icteric index-9. van den Bergh test—Negative. Urobilin test—Negative.

#### LÆVULOSE TEST

Time in hours	Blood sugar mg., per cent	Urine sugar
0	96	Nil.
1	126	Nil.
2 3	100	Nil.
3	86	Nil. Nil.

In view of the positive lævulose test it was decided In view of the positive levulose test it was decided to give him a course of calcium injections. He took ten injections of 10 c.cm. calcium gluconate (10 per cent) for ten days and afterwards took 30 grains of calcium gluconate twice daily by mouth for 20 days. During injection therapy he felt well and did not feel tired. The tongue became less coated and the appetite was definitely improved. The stools which were somewhat loose became regular and well formed. The weight, however, remained stationary (110 naunds) The weight, however, remained stationary (110 pounds).

After one month's treatment the lævulose test gave the following figures:-

Time in hours	Blood sugar mg.,	Urine sugar
0	105	Nil.
1	125	Nil.
2	110	Nil.
3	95	Nil.

The above case is interesting in that the lævulose test showed liver insufficiency when there was no enlargement nor tenderness of the liver and also that calcium therapy improved the liver function as shown by the second lavulose test.

#### Discussion

The importance of liver disorders as the cause of metabolic and gastro-intestinal disorders is becoming more evident. A large number of cases of indigestion, lack of appetite and irregular action of the bowels are due to deranged liver function. Some of these cases suffer from low grade pyrexia which may persist for many years, and offer considerable difficulty in diagnosis. If the liver is kept in mind it is easy to diagnose these cases, the criteria being enlargement and tenderness of the liver, when the ordinary causes of enlargement of this organ are excluded. There are probably other cases with similar symptoms but without an enlarged or tender liver such as case 9, but their diagnosis at present is difficult because, with the doubtful exception of the lævulose test, the liver function tests are not delicate enough to detect minor grades of liver disorders.

The treatment of gastro-intestinal disorders secondary to hepatic disease has been far from satisfactory in the past. This is partly due to lack of appreciation of minor grades of liver dysfunction as the cause of such disorders and partly because the average physician does not seem to be fully acquainted with the pharma-

cology of the liver.

Although the present series of cases are too few to form a definite conclusion about the efficacy of calcium in liver disorders, by the encouraging results reported in this paper it is hoped to stimulate further work in this direction.

My thanks are due to Mr. B. D. Kochhar, M.sc., and Dr. Abdul Qayyum Malik for the help they rendered me in carrying out this work and Dr. K. A. Hameed of the 'Cipla' Ltd. for supplying me with liberal samples of 'Calcima' brand of calcium gluconate.

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## PROPHYLACTIC ANTI-RABIC VACCINE FOR ANIMALS

By W. J. WEBSTER, M.C., M.D., D.P.H., D.T.M. & H. LIEUTENANT-COLONEL, I.M.S.

J. P. McGUIRE E. D. STEPHENS

and

#### B. N. LAHIRI

(From the Pasteur Institute of India, Kasauli)

SMITH et al. (1938) reported an experiment which suggested that a popular proprietary antirabic vaccine for animals given by the 'one-shot' method affords less protection to street virus infection than does the Kasauli vaccine given by the seven-dose method recommended. As the numbers of animals used in this experiment were rather small it was proposed to repeat the comparison on a much larger scale using both dogs and monkeys. The matter is one of some practical interest.

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Anti-rabic vaccine experiments with dogs have been notoriously unsatisfactory in the past and this attempt was no exception. In fact the experiment had to be abandoned because out of 120 dogs originally employed all except 42 died of 'other causes', mainly distemper.

Brown monkeys, Silenus (Macacus) rhesus, weighing about 20 lbs., were divided into three groups of 23 animals each. The monkeys of the first group were given the Kasauli 6 per cent sheep's brain carbolized vaccine in seven daily subcutaneous doses of 5 c.cm. each. On the seventh day the monkeys of the second group were given one dose of the proprietary vaccine. The third group of monkeys received no treatment. One hundred days after completion of this treatment all the 69 monkeys had injected into the deep muscles of the neck 2 c.cm. of a 2 per cent emulsion of the brain of a rabbit which was completely paralysed 15 days after intracerebral infection with the brain substance of a dog which had died of naturally acquired

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rabies. Negri bodies were present in the brains of both dog and rabbit. The results of this experiment are shown in the table, the monkeys having been observed for a period of 98 days after the test dose of street virus was administered. In all cases of death from rabies the diagnosis was confirmed histologically.

TABLE

Prophylactic treatment	Number	DIED	
employed	monkeys tested	'Other causes'	Rabies
Kasauli vaccine	23	Nil	1
Proprietary vaccine	23	Nil	15
No treatment (controls)	23	1	13

It appears reasonable to conclude that the course of Kasauli animal vaccine affords better protection against street virus infection than the proprietary vaccine given by the 'one-shot' method. Repeated doses of the latter might give better results but the 'one-shot' method is popular in India and it appears desirable to report that this may not be adequate. No attempt is made to compare the two vaccines in terms of equal dosage of brain substance nor to assess the value of vaccine treatment after exposure to infection has occurred. This note merely contrasts the possible protective value, before infection, of two methods of prophylactic treatment which are in general use in India. The experimental results should be of interest to dog owners and to persons responsible for planning anti-rabic vaccine campaigns among

For several years an attempt has been made to collect figures regarding the anti-rabic treatment of dogs with Kasauli vaccine. Reports have, however, been received in respect of less than 60 per cent of the dogs inoculated. The consolidated figures for the three years 1936 to 1938 are as follows:-

Reports received in response to enquiries made six months after completion of inoculation

	AFTER I	NOCULATED EXPOSURE FECTION	Dogs inoculated prophylactically		
Total inoculated	Number	Deaths believed to be due to rabies	Number	Deaths believed to be due to rabies	
4,349	767	18	1,838	1	

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# WHEREIN LIES THE ACTIVITY OF SULPHANILAMIDE?

By U. P. BASU, D.Sc., P.R.S.

(From the Bengal Immunity Research Laboratory,
Barnagore, Calcutta)

SINCE the development of modern 'Chemotherapy' by Paul Ehrlich, various synthetic compounds have been offered to clinicians for treatment of disease. Amongst these the compound-hydrochloride of 4'-sulphonamido-2, Domagk which 4-diaminoazobenzene-with (1935) experimented was a remarkable advance because it extended Ehrlich's chemotherapy to the treatment of infections as yet not influenced by any chemical. Subsequent researches in this direction further show that, for the major portion of the bactericidal effect of the azo dye, the sulphanilamide grouping present is mainly responsible. Of course, there is now considerable difference of opinion as to whether sulphanilamide itself is or is not the sole active agent in this new therapy. Still, in view of the great therapeutic significance of sulphanilamide, extensive investigations have been carried out to discover its mode of action on the one hand, and to obtain a more effective but less toxic substitute on the other.

At the outset, it may be pointed out that the active radical common to all the drugs now in

use is N > s. But this does not mean

that the presence of nitrogen or sulphur is absolutely essential for the development of the chemotherapeutic activity, as Levaditi, Girard and Vaisman (1938) noticed an activity in diphenyl sulphone,—(HO.C<sub>6</sub>H<sub>4</sub>)<sub>2</sub> dihydroxy SO<sub>2</sub>—, and Mayer and Oechslin (1939) in p-nitrobenzoic acid, p-NO<sub>2</sub> C<sub>6</sub> H<sub>4</sub> COOH. replacement of the amino group from the para to the other positions, or, the addition of amino or sulphonamido group in p-amino benzene sulphonamide molecule, however, lowers the efficacy of the drug. The substitution of the amino hydrogen of the p-amino group in sulphanilamide might either increase the solubility, lessen the toxicity, or both, but would not have any influence on the efficacy or the range of activity of the drug. The replacement of the amide hydrogen of the sulphonamido group by other radical or nucleus has again afforded a number of products that are equally, if not more, effective against infections affected by sulphanilamide itself, and in addition possess certain advantages over them in gonococcal and pneumococcal infections. The recent observations of Climenko, Crossley and Northey (1939) on the efficacy of the sodium salt of disulphanilamide in mice infected with a strain of human influenza virus, is of more than theoretical interest as it raises the possibility of influencing virus diseases with this group of drugs.

The question how and in which way the sulphanilamide or any of its derivatives produces

the therapeutic effect in bacterial infections, still remains unsolved. From general considerations the compound may exert its characteristic effect by being a simple disinfectant, by stimulating the natural defences of the body or by acting by a combination of these two factors. But unlike the well-known germicides such as acriflavine, brilliant green and others, sulphanilamide is neither instantly bactericidal nor even instantly bacteriostatic. The effect of sulphanilamide on the growth of micro-organisms is more pronounced in ordinary infusion broth in comparison with that in rabbit serum (Gay et al., 1939) A review of the whole literature shows that the drug is bactericidal by some adjuvant factors [Nitti, Bovet and Depierre (1937), Finklestone-Sayliss, Paine and Patrick (1937), Lockwood (1938) and others]. The bacteriostatic as well as the bactericidal activity varies, not only with the type of culture, but also with the nature of the substrate. Sulphanilamide is active against streptococci in vivo but ineffective in peptonecontaining broth at ordinary temperature. The activity in the latter medium may be restored by raising the temperature to 39 to 40°C. [White and Parker (1938), Weld and Mitchell (1939)]. The observation of Britton (1938), that it is active against pneumococcus type I in peptonecontaining broth but practically inactive in vivo, makes the problem more complex.

One of the necessary conditions for its therapeutic action is that the organism and the drug should actually meet in the body of the host (Browning, 1939), as it does not set up any permanent anti-bacterial condition within the body. It may be mentioned that antiseptics like acriflavine are fixed by streptococci whereas the drugs of this group are neither changed nor fixed by contact in vitro with large masses of the bacteria. Still there exists a quantitative relationship between the concentration of the drug and the number of bacteria (McIntosh and Whitby, 1939). A higher concentration of the drug is effective against a greater number of organisms and a lower one against the smaller number. In all cases, however, a definite bacterial multiplication takes place at least for the first few hours. This feature—a 'lag' phenomexperiments enon—is invariably noticed in whether carried out in vitro or in vivo. What is the cause of this delayed action? Is it due to the time required for a chemical transformation of the drug in the body or is the drug gradually entering into some chemical combination with the hacterial protein? That the drug does not act directly upon the micro-organisms is also evident from the micro-organisms is and evident from the observation of Levaditi and Vaisman (1938) that sulphanilamide is more potent when absorbed via the gastro-intestinal tract than when level to the gastro-intestinal tract than the gastro-intestinal tract the gastro-intestinal tract than the gastro-int tract than when locally applied, or, when injected directly into the directly into t ted directly into the peritoneum for immediate contact with the inferitories for immediate contact with the infectious agent. Levaditi and Vaisman (1938) Vaisman (1938a), from their study on the effect of the drug on heave also of the drug on bacterial endotoxins, have also suggested that the suggested that the drug has to undergo a change

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in vivo in order to exert its neutralizing action on the endotoxin. This is very difficult to reconcile with the conception advanced by Barron and Jacobs (1937) as well as by Chu and Hastings (1938) that the drug behaves in such a way that the organisms are unable to utilize the nutriment from the body of the host. Evidence is also lacking to show that the production of toxin by the bacteria is inhibited, or, if formed, then it is inactivated by the drug [Osgood and Powell (1938), Gross et al. (1938), Gay et al. (1939)]. Even the virulence of the micro-organism is in no way impaired by contact with the drug in a concentration as high as 1 in 2,000 (Browning, 1939).

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The other point that may be considered is whether the drug has any stimulating action on the natural defences of the body. In clinical study, leucocyte counts do not show any variation other than the usual daily fluctuation, and consequently the drug does not stimulate leucocytosis [Gay and Clark (1937), Mellon et al. (1937)]. Osgood and Powell (1938) and Gay et al. (1939) have again observed no evidence of any marked opsonic action of the drug. The general belief now is that the production of antibodies is not stimulated and there is no direct action upon the phagocytic mechanism in the body of the host [Reid (1939), Traut and Logan (1939), McIntosh and Whitby (1939)]. It seems therefore that the drug, by one or other change, inhibits the growth of bacteria, and this necessarily causes a suppression of their aggressive Under such circumstances, the character. natural body defences may easily play their part and ultimately help in the immunity mechanism.

What, then, is the factor that contributes to the remarkable chemotherapeutic action of a group of drugs otherwise possessing a weak antibacterial property in vitro? It was Mayer (1937) who first suggested that the antistreptococcal effect of sulphanilamide might be due to some other substance produced from the drug in vivo, and considering the first product of oxidation of an aromatic amine to be the hydroxylamine, he pointed out that p-hydroxylaminobenzene sulphonamide is the active substance in this therapy. A rider to this hypothesis was further added by Locke, Main and Mellon (1938) from their belief that such an oxidation would enhance the anticatalase activity which sulphanilamide and several allied compounds were found to possess (Main et al., 1938, Shinn et al., 1938). Whether the hydroxylamino derivative is sufficiently stable or not in the system, its presence, though in very low concentration, is indicated from the recent experiments of Rosenthal and Bauer (1939) with urine of patients. But the anticatalase activity alone cannot truly explain the mode of action of this group of compounds (Long and Bliss, 1939). Harris and Michel (1939), from their clinical observations, have deduced that sulphanilamide is partially converted by the body into some

active agent which, functioning as an oxidant, is supposed to be responsible for the occurrence of methæmoglobinæmia in patients receiving therapeutic doses of the drug. As this formation of methæmoglobin is frequent both in adults and children, irrespective of the sex, it would not be unnatural to postulate that in its formation lies the factor on which the activity of the drug depends. In other words, is this oxidizing agent then simultaneously accounting for the toxic symptoms as well as for the therapeutic effectiveness of the drug? (Shaffer, 1939).

The most common toxic effects that have been reported following the use of this group of drugs have been nausea, vomiting, depression, dizziness, fever, headache, acidosis, cyanosis, decrease in hæmoglobin and red blood corpuscles. But the majority of these are not of such a nature as to contra-indicate the use of the drug. The most serious types of toxic manifestation are acute hæmolytic anæmia and agranulocytosis; but these rarely occur. Sulphanilamide causes an acidosis due to alkali deficit occurring from the loss of excess of sodium and potassium in the urine. It produces a decrease in pH of the blood and increase in the pH of urine (Long and Bliss, 1937 and 1937a). The administration of sodium bicarbonate prevents the occurrence of any clinical acidosis. But the most common symptom in patients receiving therapeutic amounts of sulphanilamide or, retaining 4 mgm. of sulphanilamide per 100 c.cm. of their blood, is the development of cyanosis, or, blueness of the skin (Wendel, 1938, Bensley and Wilen, 1939). It is invariably associated with the formation of methæmoglobin [Hartmann, Perley and Barnett (1938), Evelyn and Malloy (1938), Wendel (1938)] and occasionally with that of sulphæmoglobin (Colebrook and Purdie, 1937). Marshall and Walzal (1937), however, suggest that the cyanosis may not be due to any change in the condition of the blood pigment but may be due to the formation of an oxidation product of sulphanilamide (Ottenberg and Fox, 1938). The observations of Harris and Michel (1939) that the intensity of methæmoglobinæmia is proportional to the concentration of the drug, tends to show that the methæmoglobin formation during treatment is a definite action of the drug. Sulphanilamide itself cannot oxidize hæmoglobin in vitro, whereas in contact with body tissues it undergoes a change that is responsible for the production of methæmoglobin (Harris, 1939). Very recently Wendel, Wendel and Cox (1939), from their spectrophotometric and simultaneous gasometric analyses of fully oxygenated blood from cyanotic patients, have expressed the opinion that the pigmentation during sulphanilamide therapy is for the most part due to the formation of methæmoglobin.

Such a phenomenon is not a new one as various substances, e.g., aniline, acetanilide, nitrobenzene, etc., have been found to cause cyanosis and methæmoglobinæmia in vivo, though they have no action on hæmoglobin

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in vitro (McEllroy, 1919, Scott and Hanzlik, 1920). Considerable differences of opinion exist regarding its mechanism, but the general belief now is that p-amino phenol formed in the system from the above aniline bodies is mainly responsible for this cyanosis [Heubner and Schwedtke (1936), Schwedtke (1938), Michel et al. (1937), Harrop and Waterfield (1930)]. The p-aminophenol (I) is readily oxidizable to p-iminoquinone (II) and this transformation being reversible, a small amount of either agent would produce many molecules of methæmoglobin.

In in vitro experiments sulphanilamide can be oxidized to quinone (III), when it would not be unreasonable to expect that an oxidation in in vivo may lead at least to the formation of p-iminoquinone (II). If this latter product be once formed in the body, it would establish an oxidation-reduction equilibrium with p-aminophenol (I) and, as such, may be the cause of the oxidation of hæmoglobin to methæmoglobin (Rimington, 1939). On this basis, the formation of methæmoglobin would first depend on the ease of oxidation of sulphanilamide drugs to p-iminoquinone. In clinical practice, too, the rate of formation of methæmoglobin is found to be much lower in 2-(p-aminobenzene sulphonamido)-pyridine (IV) and p-benzylamino benzene sulphonamide (V), two products less susceptible to decomposition from chemical consideration [Harris and Michel (1939), Finland (1939)]. Acidosis, by interfering with absorption of alkalis in renal tubes, and an increase in the urinary excretion of porphyrin, are two other common physiological disorders during this chemotherapeutic treatment (Rimington and Hemmings, 1938). The two effects are again minimum in the case of compounds (IV) and (V), indicating thereby that the various toxic manifestations depend on one and the same factor. The injection of methylene blue (0.1 to 0.2 c.cm. per kilogramme of body-weight of a one per cent aqueous solution) removes the methemoglobin from the circulating erythrocytes without any injurious effect on the host, and thereby restores the oxygen-carrying capacity of the blood (Wendel, 1939). This seems to be logical as this readily reducible dye, by disturbing the reversible reduction-oxidation equilibrium between the above two agents, would then inhibit the formation of any further quantity of methæmoglobin. Any conjugation of sulphanilamide would make it more resistant to

oxidation and this would in turn lessen the probability of any change in the hæmoglobin molecule. Such a conjugation has been actually found by Bensley (1940) to reduce the formation of methemoglobin. All these then point to an alteration in the composition of sulphanilamide in the body. Further, the fact that the concentration of both free and acetylated sulphanilamide is invariably higher in the corpuscles than in the plasma, again indicates an existence of a close relationship between blood corpuscle and sulphanilamide (Hansen, 1939). It really suggests a sort of combination between something within, or on the surface of the corpuscle and the drug. As the method of estimation of distribution of the drug has been traced by means of diazo (colour) reaction with the p-amino grouping of the drug and no consideration is being made for the sulphonamido-SO.NH. grouping, so the question remains unsolved whether the product that tends to be associated with the red blood corpuscles is the sulphanilamide molecule itself, or some product at least in part derived from it. The problem now is whether in such transformation lies the anti-bacterial activity of the drug in question. P-iminoquinone (quinoneimine) recently found by Bernheim et al. (1938) to inhibit the oxygen uptake of body tissues and the xanthine oxidase of liver. The action is dependent on the formation of a quinoneimineenzyme complex. Does this also inactivate the bacterial enzymes (McIntosh and Whitby, 1939)? The mode of action of this group of drugs should then depend on the formation of p-iminoquinone and its subsequent conversion in such a way as to inactivate the invasive character of the micro-organisms. But the presence of such p-iminoquinone in the system will have to be demonstrated. The idea would not, however, preclude any sulphanilamide drug exerting its own characteristic pharmacological effects—whether therapeutic or toxic—depending on its ability to penetrate through the cell membrane and subsequent ease of oxidation to p-imino-

quinone inside the cell. It would be of much interest to study the exact chemical nature of the drug that is being daily excreted in the urine, circulated in the blood and more particularly remaining associated with the red blood corpuscles. The next point of importance seems to be a study on the effect of the drug on endotoxin in vitro in the presence of several body tissues under various conditions, and then to note the effect of such a mixture on treated and untreated animals. An investigation on the change, if any, in the constitution of the drug seems also to be essential All the tial. All these might bring forth a clue to the mechanism by which this group of drugs exert their characters their characters which the group of drugs exert the group of drug their characteristic pharmacological action, or, at least mich at least mich at least mich at least mich action action archiem at least might throw light on the problem whether the ovident of the problem. whether the oxidant that is invariably formed, exerts any influence exerts any influence on the anti-bacterial action of the drug. of the drug. For such a study team work from

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# A Mirror of Hospital Practice

# A CASE OF CEREBRO-SPINAL FEVER CURED BY SULPHANILAMIDE\*

### By BABU RAM GARG Muzaffarnagar, U. P.

A BOY aged 14 had an attack of 'fever' and headache on 16th March accompanied by frequent liquid stools. The temperature increased but was not recorded as a

thermometer was not available.

I first saw him the following morning and found his axillary temperature 103.5°F., pulse 120 and respiration 20 per separation in character. 20 per minute, sighing in character.

\*Rearranged by Editor.

The patient was deeply unconscious—pupils fully dilated, equal and did not react to light, and reflexes were absent. There was no stiffness of the neck nor head retraction but pressure over the spine caused twitching of the face muscles indicating that it was painful.

Diagnosis was doubtful as at the time I had no needle to do a lumbar puncture and there were no similar cases in the village.

The boy could swallow liquids so he was given six doses of a hexamine mixture and six powders (half gramme each) of Septalinum, Glaxo (a sulphanilamide product).

On 18th March, the condition was unchanged except that one pupil was now smaller than the other. The parents refused permission to do a lumbar puncture.

The same treatment as on the previous day was continued with the addition of an intravenous injection of 5 c.cm. of 'Aktisol', a sulphanilamide drug.

On 19th March the boy was brought to my dispensary and on lumbar puncture 23 c.cm. of opalescent fluid under pressure was allowed to escape. Microscopically it contained large numbers of intracellular diplococci. The left pupil was more nearly normal and reacted The left pupil was more nearly normal and reacted slightly to light.

He was distinctly better on the 20th, consciousness was returning and the pupils were normal in size and

reaction.

On the 21st, the boy was fully conscious. Lumbar puncture was again performed and 50 c.cm. of clear fluid evacuated under slight pressure. Diplococci in smaller numbers could still be seen. Reflexes were now

obtainable. The treatment was continued and there was steady improvement. On 23rd March 15 c.cm. of cerebrospinal fluid was withdrawn and only very scanty diplococci could be seen. Progress was maintained and on 27th March 35 c.cm. of fluid was withdrawn; and no micro-organism could be found in it. The temperature was normal. Intravenous medication was stopped but Septalinum by mouth was continued. All treatment was stopped on 30th March and the boy was discharged as cured

Conclusion .- An obviously severe case of cerebro-spinal meningitis was cured by means of sulphanilamide drugs.

#### A METHOD OF REMOVING A TIGHT RING FROM A FINGER

By Y. M. BHAVE, M.B., B.S. Sir J. J. Hospital, Byculla, Bombay

It is not infrequently that the general practitioner comes across a patient with a ring impacted on one of the fingers. The following is a useful method of removing such a ring with the least amount of trauma to the tissues involved.

Anæsthesia.—It is better to block the digital nerves with 2 per cent novocaine or in the case of children just to give a little general anæsthetic, to keep them quiet. As a general rule very



Fig. 1.

little pain is felt during the manipulations. The adrenalin content of the local anæsthetic reduces the congestion and makes the proceedings easier.

Technique.—First clean the part with rectified spirit. Starting at the tip of the finger (figure 1) a strong thread (twine would suffice) is wound round the fingers, the strands touching each other without overlapping, till the strands reach in the vicinity of the ring. The free end of the thread is now manipulated under or preferably threaded through the ring with a vaselined aneurism needle, so as to come out at the proximal edge of the ring (figure 2). Any space,

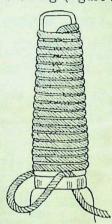
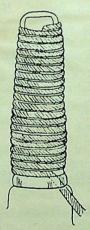


Fig. 2.

between the most proximal strand of the thread and ring, left uncovered is covered by continuing the winding, the loose proximal end of the thread being pulled so as to leave no loop between the ring and the fingers. Sterile vaseline is now applied to the ring and all the strands of the thread. The thread is now unwound, from the proximal end, a little force being usually necessary to do this (figure 3).



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Fig. 3.

The ring will be found to move very slowly forward till it slips off the finger, when the whole thread is unwound. Thick cat-gut can be used but it is to move very when the be used but only if a sufficiently long strand is available, to enable the proceedings to be finished with only one winding and unwinding.

relief of congestion brought about by direct pressure of the thread, and by the screw-like action when the thread, Mechanism.—This method works action when the thread is unwound.

Our attention has been drawn to an error on p. 179

The March number

From 'Calcium diuretin' to 'Citobaryum' the names should be lowered one line to correspond with correct particulars in columns two and three of the table.

# A Tonic and Reconstructive of Exceptional Efficiency

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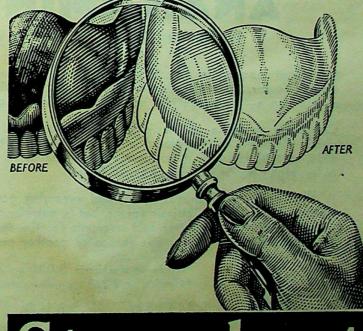
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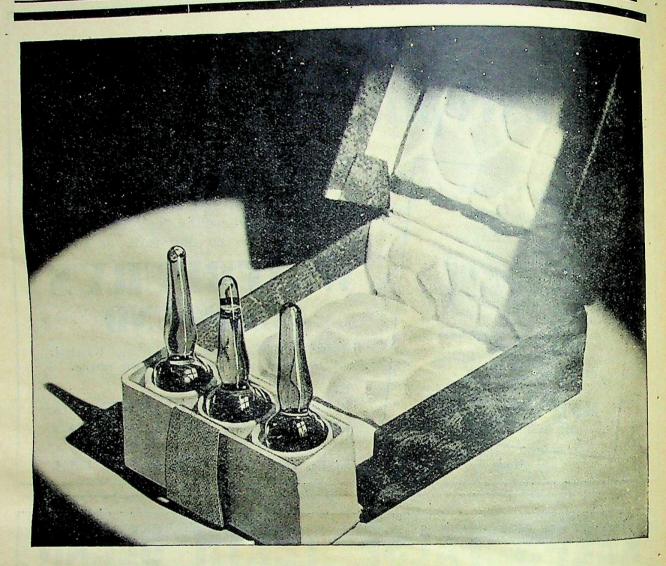
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## ANAHÆMIN B.D.H.

In Nutritional Macrocytic Anæmias

Nutritional macrocytic anæmias are stated to be due primarily to a deficiency of Castle's extrinsic factor. It is logical, therefore, to assume that they will respond to the exhibition of Anahæmin—the product of interaction of intrinsic and extrinsic factors.

Convincing evidence of the value of Anahæmin in nutritional anæmias is provided in a report (Response of Nutritional Macrocytic Anæmia to Anahæmin, Lancet, August 12th, 1939, p. 360), in which it is shown that Anahæmin is at least as active in its curative effect as less highly-purified preparations of liver.

In other words, Anahæmin is of high and unvarying activity, not only in pernicious anæmia which is due to lack of intrinsic factor, but to nutritional anæmias which are due to lack of extrinsic factor. This latter fact accounts for the restorative effect produced upon patients after operation or who for one reason or another are maintained on a restricted dietary.

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#### Indian Medical Gazette

JUNE

#### THE PROBLEM OF DRUG ADDICTION

Drugs of addiction are those which are liable, in the course of time, to take control of the individual who has become habituated to their use inasmuch as all his social and business obligations become subservient to obtaining a regular supply of his pet narcotic, and their continued use, generally in increasing quantities, to obtain the desired effect eventually leads to complete moral and physical degeneration and even death. This practice of taking drugs, not for the cure of disease but for their euphoric and stimulating effects, is one of importance as well as of considerable interest on account of the

numerous problems involved.

The habit is so ancient and so widespread throughout the human race that it almost seems that man has an innate need for stimulo-sedatives of some kind. This is suggested by the fact that when European explorers first made contact with races who had been, as far as we know, completely out of touch with other races for immeasurably long periods of time, most of them were found to be using regularly some form of narcotic or stimulant drug. For example the natives of the South American jungles were accustomed to use cocaine in a crude form, and even in remote Australia the primitive and widely scattered nomads inhabiting this country had a plant of similar nature, which although very mild in its action was greatly prized and was of high trade value between parts of the country where it grew and those places where it was not found, so that it was passed from tribe to tribe over many hundreds of miles of sparsely populated country. In large parts of Asia and Africa Indian hemp has been used from as far back as records go, and it is probable that the practice began in the earliest stages of man's social development in these countries. Elsewhere in this issue there is a full summary of the subject of hemp drug addiction in this country, which embraces the earliest historical records of its use and traces it right up to the present day. This report is only an account of part of the general study of the use and abuse of drugs of addiction in India, which has been carried out by Colonel Chopra and his collaborators over many years, under a grant from the Indian Research Fund Association.

World communications have improved so much and trade ramifications have spread so widely that, now in times of peace, every country or state trades with every other one in the world, and all world products are obtainable almost

everywhere. This applies to narcotic drugs as well as to other commodities and manufactured articles, and those which were originally used almost exclusively in one country or area are now obtainable anywhere. The prevention of the traffic in narcotics is a large and important problem in most countries and one on which governments are compelled to spend vast sums of money. One of the most important countries in this respect is Egypt, which on account of its geographical situation, is a suitable clearinghouse for drugs between Europe and Asia, quite apart from having a serious local problem of drug addiction of its own. As is always the case the demand has created the supply and one of the most active narcotic preventive services in the world exists in Egypt, and the work of this bureau is of great value outside its own borders because it has been able to indicate the source of origin of much of the drugs seized in that country. The world effort to limit the international traffic in dangerous drugs is greatly assisted by the League of Nations whose organization is well fitted for operations of this nature.

Before the days of rapid and frequent intercommunication throughout the world, in which every country now participates, different countries were prone to use one type of stimulosedative to the almost total exclusion of others. For instance, speaking in the broadest sense. Europe used alcohol, Asia used Indian hemp and later opium, North America used tobacco, South America used cocaine and so on. But with the free interchange of narcotic drugs as well as other products the people of Europe began to make use of cocaine and opium, and the highly potent distilled spirits of Europe were introduced to primitive races, where they began to supplant the mild fermented liquors they had been using for centuries. These fermented drinks of native origin have recently been shown in some cases to be the main source of necessary vitamins (notably the vitamin B complex) in an otherwise deficient diet, so that the change in type of alcohol used, or attempts to prohibit the local product, may cause the appearance of vitamin deficiency diseases as well as the harmful effects of the immoderate use of potent spirits.

In one respect these drugs of addiction resemble an infectious disease, in that their prolonged use by a people eventually leads to a decrease in the number of persons whose excessive consumption of the drug causes serious mental and physical deterioration, and instead the majority are found to be still using the drug, but in such moderation as not to give rise to serious symptoms. Examples illustrating this can be found almost everywhere, for instance in Europe drunkenness is almost unknown among the Mediterranean peoples who have been using wines for very prolonged periods, whereas in the more northern countries whose general use of alcohol is a more recent acquisition and whose inhabitants are inclined to drink the more potent distilled spirits more freely, as well as fermented

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beverages, drunkenness is still all too frequent. Other examples arise to the mind such as that of the Sikhs in India who take their one or two opium pills a day and appear to derive benefit therefrom, but amongst whom excessive use of opium is of the rarest occurrence, and the aboriginal natives of South America make use of cocaine in the same way and benefit by its use, but never give way to its abuse. Then let us look at the other side of the picture and see the effect of the sudden introduction to races, of a type of narcotic to which they were not hitherto accustomed. The ravages of distilled spirits among the native races of Africa, North America and the South Sea Islands after their introduction by Europeans are well known, and cocaine and opium or its alkaloids claimed and still claim many more victims in Europe and other countries, into which they were introduced relatively recently, than they do in their countries of origin where they have been used for hundreds of years. To sum up this paragraph, narcotics appear to establish some kind of immunity or resistance to their abuse in races that have used them for a long time.

Consideration of these facts raises the question as to the best method of dealing with the drug menace. While there is no doubt that preventing the introduction of new narcotics into countries not accustomed to them is of prime importance, it is doubtful if the long view would not be preferable regarding the control of narcotics that have already been in use for centuries. By this we mean that limited official efforts at restriction with the hope of the eventual disappearance of the dangerous aspect of drug addiction would perhaps be preferable to the sudden stoppage of supplies in the attempt to stamp out completely and at once the use of a certain drug. The failure of prohibition in the United States of America with its tremendous

increase in crime and excesses of all kinds as secondary effects to the attempt to stop the use of alcohol altogether, as well as the rise in the clandestine consumption of poisonous trade spirit as a drink, is a striking indictment against this method of control. Another difficulty regarding the absolute prohibition of these drugs is that their cultivation and manufacture cannot be totally prohibited because large amounts are necessary for their legitimate use, the treatment and cure of disease.

Addicts to any drug can be treated, and often successfully, to overcome their craving. A striking example is the success of the lecithin and glucose treatment of opium addiction practised in recent years at the Calcutta School of Tropical Medicine. This is also a complicated problem, because although it is agreed that a great deal can be done in freeing a slave to the habit from the influence of a drug, it is now considered by those with experience in this matter that a large number are bound to relapse. Although such reasons as the example of companions, business worry, prolonged painful illness, etc., are given and accepted as explanations of beginning the habit, it is now stated that, in addition to one of these causes, there is an inherent weakness in the individual which is the basic cause of his subordinating his own initiative to the power of a drug. Even if he is relieved of this influence by treatment and the craving disappears for a time, the weakness is still there and is likely again to become manifest by a relapse into his former habit of excessive drug taking.

A short article of this kind is not the place for the discussion of preventive measures in detail as the problem is much too vast, so we have confined ourselves to the statement of a few aspects of the subject to indicate in some slight

degree its complexity and difficulty.

#### Special Articles

#### USE OF HEMP DRUGS IN INDIA\*

By R. N. CHOPRA, C.I.E., M.A., M.D., SC.D. (Cantab.), F.R.C.P. (Lond.)

\*\*BREVET-COLONEL, I.M.S. (Retd.)

(From the School of Tropical Medicine, Calcutta)

#### Historical and General

Introductory.—The habitual use of drugs of a stimulative and restorative character was prevalent in India probably long before any of the other countries of the modern world. The juice of the Soma plant was a favourite drink of the Aryan settlers and was regularly taken by them many centuries before the Christian era. What

exactly was the Soma plant is not known, though a number of plants such as Cannabis sativa, Ephedra vulgaris, Asclepias acida, etc., have been implicated. During the Hindu period, i.e., up to the 8th or 9th century A.D., alcoholic beverages were used by the people as well as the preparations made from hemp drugs. These produced not only a sedative effect, but also brought about euphoria in the form of pleasant dreams, forgetfulness and, it would also appear from the writings of that period, voluptuous satisfaction. Opium and poppy were introduced on the west coast about the gentlement of the Mohammedan traders and opiates soon came into use. Study of the records shows that during the period of the Moghul Empire alcoholic beverages, opiates and hemp drugs were freely used.

<sup>\*</sup>Being a lecture delivered at the Royal Asiatic Society of Bengal on the 29th of March 1940.

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decoction made from poppy capsules known as 'koknar' was extensively used all over India. A beverage containing wine, opium, Indian hemp and poppy capsules, known as 'Cháharbargha' (four-leaved), was drunk by the well-to-do classes in the time of Akbar (1556 to 1605) and later. Opium on account of its stronger effects appears to have taken a great hold on the people, and poppy was extensively cultivated all over the country during this period and was indulged in by all classes.

The hemp drugs commonly used in India are derived from the flowers, fruits, leaves (and the resinous matter derived from the leaves), young twigs, and bark of the stem of the plant known as Cannabis sativa Linn. The plant belongs to the family Cannabinaceæ and has been found growing in a state of nature to the south of the Caspian Sea, in Siberia, in the desert of Kirghiz in Russian Turkestan, in Central and Southern Russia and along the southern lower slopes of the Caucasus mountains. In China, where probably it is indigenous on the lower mountain tracts, it has been known since the 6th century B.C. It grows in almost a wild state in Iran and in the Western Himalayas and Kashmir, and it extends to the east of Assam.

For some time the European form of the plant was supposed to be distinct from the Asiatic, the chief value of the latter consisting in its narcotic properties; but this distinction has now disappeared from the literature on the subject. Cannabis indica Lamk., the Indian plant, has thus been reduced to G. action Line.

thus been reduced to C. sativa Linn.

The hemp drugs are used in India in three principal forms, ganja, charas, and bhang. Ganja is the female flowering tops and twigs covered with resinous exudation, charas is the resinous exudation found on the leaves, young twigs, bark of the stem, and even on the young fruits; bhang is composed of the mature leaves and in some parts of India of the fruits also.

Early historical references. (a) In Hindu medicine.—
Mention of hemp drugs is found in the classical
literature as well as in the works on medicine of many
countries old in the world. The plant is referred to
in the ancient Sanskrit literature under the three
names: 'bhanga', 'indracana' and 'vijaya' or 'jaya'.
The earliest mention of the word 'bhang' occurs in the
Atharva Veda which, according to Western scholars,
dates from 2000 to 1400 B.C.
The first mention of 'bhanga' as a medicine occurs
in the works of Susruta (6th to 7th century A.D.)
where it is described along with a number of other drugs

The first mention of 'bhanga' as a medicine occurs in the works of Susruta (6th to 7th century A.D.) where it is described along with a number of other drugs as an antiphlegmatic. In the 10th century A.D., the intoxicating properties of the plant seem to have been already recognized. In the 14th century, the intoxicating properties of 'bhanga' were certainly well known as it is mentioned in some of the dramatic literature

of that period.

In Sarangadhara Samhita, a medical work written about 1500 A.D., it is described as an excitant and is mentioned along with opium in the same passage. In the Bhavaprakash (about 1600 A.D.), a number of important properties of the hemp drugs are given with special stress on its digestive and stimulant effects on biliary secretions.

biliary secretions.

(b) In Arabian and Persian medicine.—Hemp is frequently mentioned in the early Arabic and Persian literature. The oldest work in which it is noticed is

a treatise by Hassan (658 A.D.). In the Arabian Nights, frequent references to hemp have been made under the old name 'benj'. The Arabic name 'benj' and the Persian name 'beng' are so closely related phonetically to the Sanskrit 'bhanga' that there is a strong presumption of their origin from the latter source.

(c) In European literature.—Hemp is also frequently mentioned in the early classical literature of Europe. The ancient Scythians seem to have been acquainted with the narcotic properties of the plant as well as with its fibre. They used to induce a state of excitement amongst themselves by inhaling its vapour. More recently, hemp was brought to the notice of European medicine through the accounts of Sylveste-de-lacy in 1809 and Rouyer in 1810. These authors were attached to Napoleon's expeditionary forces in Egypt and during their stay there, collected a large amount of information regarding hemp drugs and published their findings and observations.

#### PRODUCTION OF HEMP DRUGS IN INDIA

(a) Wild growth.—As has been already stated, hemp grows wild over extensive tracts in northern India and along the slopes of the Himalayas. It is interesting to note that hemp seems to have the capacity for growing with equal luxuriance under almost any climatic conditions. With the change of climate, and the consequent alteration in the conditions of growth, however, some of the important characters of the plant are changed or modified. Thus, in Europe, hemp produces a valuable fibre, while showing little or no tendency to produce the narcotic principle, which in Asia constitutes its chief value. On the mountain tracts of upper India, hemp yields a fairly good fibre, but in Kashmir and Ladakh, its narcotic principles become much more predominant. When hemp is cultivated in the plains of India, the resin (charas) is not generally secreted but the young female flowers and shoots show a tendency to develop the narcotic principle (ganja) instead. In other parts of India again, the narcotic property is often not developed until the fruits are

The plant grows wild throughout the Himalayas from Kashmir to the east of Assam at an altitude up to 10,000 feet above sea-level. It extends down the southern slopes of the mountains and from there into the Punjab and the Gangetic plain for a limited distance. It is found in the hill tracts of Assam whence it spreads to the mountainous tracts of East Bengal. The southern boundary of this area begins approximately at Peshawar and runs through the middle of the Punjab and the United Provinces, from where it follows the course of the Ganges. In this region, the plant propagates itself from self-sown seeds but it is possible that the growth on the lower slopes of the Himalayas and in the Terai is to a large extent accounted for by the aerial dissemination of seeds from the mountains. The plant appears to be very hardy once it is well established. The soil need not be rich, but it should be well drained and permeable.

(b) Cultivation.—Though hemp grows wild in many parts of India, it has to be properly cultivated in order to obtain, for commercial purposes, its fibre or its narcotic principle as the case may be. For a good growth of hemp a rich soil as well as elaborate methods of cultivation are required.

Present extent of hemp cultivation.—The Indian Hemp Drug Commission (1893–1894) obtained statistics of the area under cultivation and found that after deducting the area under fibre cultivation (which yields deducting the area under fibre cultivation (which yields little or no narcotic principle), the total area under cultivation for narcotic purposes did not exceed 6,000 acres. At present cultivation of hemp drugs for the production of ganja and bhang by the wholesale vendors is only permitted under licence and is considerably less than 2,000 acres.

The cultivation of the hemp plant for intoxicating purposes is absolutely prohibited in Assam, United Provinces, and in the minor provinces of Delhi, Baluchistan, Coorg and Ajmere-Merwara, while in some of the major provinces, it is permitted, for the

of the major provinces, it is permitted, for the production of ganja only, in limited areas and subject to careful restrictions. Thus, in the Bombay Presidency the cultivation is allowed in four villages of Nagar taluk in Ahmednagar district. In Bihar and Orissa, ganja is cultivated in Bhagalpore district. In the Madras Presidency, ganja is cultivated only in the the Madras Presidency, ganja is cultivated only in the village of Santaravur. In the Central Provinces and Berar, cultivation of the plant is restricted to a small area in Khandwa district. These areas are only able to meet the actual demand for their respective provinces. The main supply of ganja, however, comes from a place called Naogaon in the Rajshahi district of Bengal. This small area supplies ganja to the whole of the Bengal Presidency and also to other provinces, Indian States, and foreign territories where cultivation is prohibited.

If we compare the present figures with those published by the Indian Hemp Drug Commission in 1893-94, we are struck with the progressive decline of hempdrug cultivation in India. For years together, the Government of India has followed a policy of gradually cutting down the area of hemp under cultivation and the total yearly outturn with the idea of reducing the hemp-drug addiction to a minimum. Hemp is not cultivated in this country for the production of charas and therefore these remarks do not apply to this form. and therefore these remarks do not apply to this form

(c) Manufacture of bhang, ganja and charas. -Hemp drugs that are obtained by cultivation or from spontaneous growth require further treatment at the hands of experts before they are fit for consumption as narcotics.

1. Manufacture of bhang (synonyms 'siddhi', 'subzi', 'putti', 'sawi').—Bhang consists of specially dried leaves and flowering shoots of both female and male plants, wild or cultivated. The inclusion of male plants and male flower heads in the manufacture of bhang is not considered of special advantage as the male flowers are believed to contain very little of the active principle. Recent work has thrown doubt on this belief.

The narcotic principle in hemp develops only when the plant matures, reaching its maximum about the time of flowering and then it gradually begins to disappear when the leaves and the flowers turn yellow. Therefore, for the manufacture of good bhang, the leaves should be separated when they are just mature and when there are no signs of decay or withering. The usual time for gathering leaves varies in different localities but generally it is done during the months of May and June in the plains and during July and early August in the hills.

2. Manufacture of ganja.—Ganja ['ganja yala' (Tamil) and 'bhangaku' (Telegu)] consists of dried flowering tops of the cultivated hemp plant which become coated with a resinous exudation, chiefly from the glandular hairs, in consequence of being deprived

of the opportunity of setting seeds. To secure these of the opportunity of secure these results, the male plants are removed from the field at results, the male plants are removed from the field at an early date. As the female plants begin to form ganja, all the large Jeaves on the stem and branches are also removed. The smaller leaves and the brackets of inflorescence become agglutinated into a mass called a rusty green called of inflorescence become aggrerated into a mass called ganja. Fresh excise ganja has a rusty green colour with a characteristic odour. The colour and the smell are considered to be features of merit but as a rule are considered to be features of leaf is recomb are considered to be leadines of ment but as a rule ganja which has least mixture of leaf is regarded as the best. The plants thus collected require further treatment to form the ganja of commerce sold by the excise vendors. In Bengal the entire plant is cut. while in Bombay the flowering tops are generally pulled off by hand.

Manufacture of charas.—Charas is the name given to the resinous matter collected from the leaves and flowering tops of the plant and constitutes the active principle of hemp. Charas, as sold in this country, is a greenish mass, with a peculiar and characteristic When kept for some time, it becomes hard and friable and acquires a brownish-grey colour, thereby

losing most of its narcotic properties.

Although the hemp plant, when cultivated in tropical countries such as India, Africa and Malaya, becomes rich in narcotic principles, it seldom yields enough resin to be collected as charas. On the plateaux of Central Asia and southern Himalayas (Nepal) charas is sometimes collected, but it is poor both in quality and yield. The best quality and the maximum amount of resin is obtained from plants grown in Yarkand in Chinese Turkestan in Central Asia.

Manufacture of charas in Chinese Turkestan.-In Chinese Turkestan at an altitude of 3,000 to 5,000 feet above sea-level, Cannabis sativa grows extensively in a state of nature. It is also cultivated along with other The plant flourishes well in these plateaux often attaining a height of 8 to 10 feet. It matures during the month of September or October when big tufts of flowers appear at the top of each plant, which can be collected and used in the preparation of finished charas. The method of charas manufacture in these areas is entirely different from that in use in India. The female flower heads are first dried, then broken and crushed between the hands into a powder, which is passed through sieves so that it attains the fineness and consistency of sand or saw dust. This powder, which is still green, is stored in bags made of raw hide for four or four and the same state. four or five months during the winter. With the onset of the hot weather the material is taken out and exposed to the sun for a short time, sufficient to allow the resin to melt. It is stored again in hide bags of 10 lb. to 14 lb. capacity. After a few days, the agglutinated mass is again taken out and kneaded well agglutinated mass is again taken out and kneaded well by means of wooden rods so that a certain amount of oily matter appears on its surface. The process of kneading is repeated till each bag yields about one to two lb. of oil. At this stage charas is transferred into fresh hide bage and his stage charas is transferred. fresh hide bags and is ready for sale and distribution.

Trade and traffic in charas.—Charas forms one of the most important articles of trade between Central Asia and India. It is usually brought down from Yarkand in the month of Assacration and in the month of August when the mountain passes are opened and it reaches Leh in Kashmir by September or October. The payment for charas is usually made in kind and not in currency. All forms of piece-goods which are apparently in great demand in Central Asia are generally accepted as barter.

The traffic in charas has always been carefully regulated by the Punjab Government; the charas bundles are checked at Panamik and again at Leh in Kashmir State to compare the character. Kashmir State to ensure that any bundle which reached Leh (where the Punjab Government has established a warehouse and maintains warehouse and maintains a special staff) was again accounted for either in Kashmir State or in one of the Punjab warehouses. Punjab warehouses. Each bundle of charas, which ordinarily weighs about 50 seers (100 lb.), is recorded in Leh and forwarded either to Kulu or to Rawalpindi, or is consumed locally under the central of Kashmir or is consumed locally under the control of Kashmir State authorities in the State. There are four Kulu), houses in the Punjab, at Sultanpur Hoshiarpur, Amritsar, and Rawalpindi. The Government of Chinese Turkestan have now totally stopped

the import of charas into India.

Illicit traffic in charas and measures to combat it.—
Contraband charas comes into India nowadays mostly
through Chitral and to a certain extent through
independent tribal territories. It is also brought across
the Indus river principally to the neighbourhood of
Peshawar. The drug is mainly smuggled by travellers
who carry small quantities at a time upon their persons.
Very often it is said to be exchanged for smuggled
cocaine from Calcutta and other parts. In fact, it has
been stated that the practice of charas smuggling in the
Punjab and the North-West Frontier Province has been
responsible for the introduction of the cocaine habit in
those areas.

In parts of India where the consumption of the drug is totally prohibited, there is reason to believe that illicit charas is still being sold to a certain extent. In other parts where the consumption is permitted but the duty is high our inquiries reveal that smuggling is far from being checked and the drug is frequently obtain-

able through illicit sources. .

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#### THE NARCOTIC PRINCIPLES OF HEMP DRUGS

An interesting feature about the formation and development of the narcotic principle is that this process is generally found to be associated, and sometimes runs parallel with some distinct morphological modification of the plant anatomy. In some plants, the leaves are the chief organs where the narcotic resin is found; in others, the flowering tops assume the important rôle of storing and secreting the resin; while in a third group, the fruits and the surfaces of stems take upon themselves the secretory function. The first group of plants where the narcotic is primarily stored in the leaves yields the bhang of commerce, the second group affords ganja, and third group is considered particularly suitable for the production of charas. The factor or factors which are responsible for such modifications in the physiology of the hemp plant are not known.

The resinous substance contained in hemp is considered the most important principle responsible for the physiological activity of the drug. The resin as obtained from the plant apparently contains a number of compounds, one of which is cannabinol (Cahn) and which is probably the active principle. There is no satisfactory evidence to show that the other constituents are physiologically active.

Deterioration of the narcotic principle.—The narcotic principle of the hemp drugs deteriorates with age, though it is difficult to give the precise period during which a preparation can retain its activity under ordinary conditions of storage. The popular impression is that hemp drugs retain their activity for a period of at least two years without appreciable loss. Some authorities consider that the potency remains intact for a much longer period. The experience of the excise authorities in the plains of India is that ganja retains most of its activity for one year and during the second year it begins gradually to lose its potency until it becomes quite useless and unsaleable at the end of two years. It must be realized, however, that the retention of physiological activity of the three different types of hemp drugs, like that of many other medicinal products, largely depends on the climate and also on the care exercised during its storage. Bhang is not as susceptible to deterioration as ganja and may keep in fairly good condition for three to four years, if not

directly exposed to sun and air. This comparatively slow deterioration of bhang is supported to a certain extent by the subjective symptoms complained of by the bhang addicts.

With regard to the keeping properties of charas, it it still more difficult to make any definite statements. However, the general opinion of dealers in this drug is that charas is very potent during the first year, after which it gradually loses its activity until the fourth year, when it becomes practically inert and useless.

#### Modes of Consumption

Ganja and charas are mostly smoked, while bhang is taken by the mouth in the form of a beverage or a confection. The latter method, eating of hemp for narcotic purposes, would appear to be a much older method of indulgence

than smoking.

1. Hemp drinking and eating.—The beverage made from bhang is known by different names in different parts of India. It is called 'thandai', 'siddhi', 'sardai', 'sawi', and 'sukha' in the Punjab and United Provinces; in Bombay and Central Provinces, it is known as 'bhang' or 'ghota' or 'pang'; in Bengal, it is called 'siddhi'; in Rajputana and Central India, 'dudhii'; in South India hemp beverages are known as 'ramras' or 'ram-rasam' and correspond to 'dudhii' and 'siddhi' of upper India.

The simplest form of consumption consists of a drink made from bhang leaves by pounding them together with a little black pepper and sugar and adding enough water to reach the desired strength. Various kinds of special beverages are prepared by the middle and well-to-do classes by the addition of almond kernels, sugar, iced milk, curds, etc. A number of other ingredients are at times added to improve the taste and possibly with the idea of enhancing the euphoric effects produced by these drugs. Amongst these, aniseed, ajowan, cucumber, melon and poppy seeds, rose petals, saffron, cloves, cardamoms, musk and essence of rose are the most common. Besides their common use as a beverage, bhang leaves are sometimes chewed for their sedative effects. This is done at times when it is not convenient for the individual to prepare the beverage, for instance during travelling, and also during the winter season when the system does not require large quantities of fluid.

A number of preparations containing bhang are made in different parts of India. Sweetmeats containing bhang are sold and even ice cream containing powdered

leaves is available in some towns.

2. Hemp smoking.—Ganja and charas are usually consumed by smoking. Different kinds of apparatus have been improvised in various parts of the country for smoking hemp drugs, the one commonly used being an earthenware chillum' (used for smoking tobacco) with an elongated neck. The ordinary chillum' used for smoking ganja and charas resembles a funnel with a long neck and a somewhat wide base.

The method of smoking is simple. Ganja is first moistened with a little water to render it soft. The mass is then kneaded till it changes to a pulpy mass. A small amount of tobacco (almost equal in amount to the ganja taken) is then placed in the 'chillum' and the 'prepared ganja' is placed on the top of it. The usual practice is to place the prepared mass of ganja (or charas as 'the case may be) between two thin pieces of broken earthenware pottery. After the 'chillum' is prepared, a piece of glowing charcoal or a piece of

smouldering cow-dung cake is placed in it. The smoke is inhaled into the lungs by powerful inspiratory efforts and the narcotic principles are at once taken into the blood. The smoke is retained in the lungs as long as possible and is then allowed to escape slowly through the nostrils, the mouth being kept shut. The longer the smoke is retained inside the lungs the better the effects obtained. Apart from the 'chillum' method just described ganja and charas are also smoked by the ordinary 'hooka', the smoke being allowed to pass through water before it is inhaled. This is the common method employed in the north-western districts of the Punjab and the North-West Frontier Province, but it has not become popular in other provinces in India where smoking of hemp drugs is prevalent. Recently, cigarettes containing bhang have been used in certain towns. Both bhang and charas are occasionally smoked in an ordinary tobacco pipe, but this method has not become very popular.

sionally smoked in an ordinary tobacco pipe, but this method has not become very popular.

Unlike opium smoking, which is indulged in by the smoker alone and away from his friends, hemp smoking is always preferred and enjoyed in the company of others. The smokers, usually two to five in number, sit down in a small circle and the prepared 'chillum' is passed round from one to the other so that each can take two or three deep pulls at it. Ganja or charas worth at least four to six pice (1 or 1½ penny) is required for preparing a full 'chillum'. The quantity of hemp procurable at this price is usually sufficient to produce narcotic effects of a mild degree on three

to five persons.

Charas is smoked more or less in the same way as ganja but there is some difference in the initial preparation of the drug. Charas is usually warmed a little in the early stages and is mixed with approximately double its quantity of tobacco before being put in the 'chillum'. Charas is generally considered to be a stronger preparation and, therefore, a smaller quantity of the drug is used.

Besides ganja and charas, bhang leaves are also smoked at times. 'Sirkali' or the flowering tops of the hemp plant are sometimes cut and dried and smoked in a 'chillum' alone or mixed with tobacco.

#### USES OF HEMP DRUGS IN INDIA

Hemp drugs have been used in India from very early times in order to overcome fatigue and worry, for production of euphoria, and to give courage to warriors during times of stress. The present use of these drugs may be conveniently considered under three main headings:

(i) use in connection with religious and social customs, (ii) medicinal uses, and (iii) employment for narcotic and euphoric purposes.

(i) Uses in connection with religious and social customs.—The use of hemp drugs in connection with religious and social practices is still met with in almost all the provinces of India, though, to a much smaller extent than in the

past.

In Bengal, for instance, the custom of offering a beverage prepared from the leaves of the hemp plant to the members of the family and to the guests present on the last day of the Durga Puja (Bijaya Dasami) still persists. In Tarakeshwar Temple in Bengal ganja is used as an offering on the Shivaratri (Shiva's night). Less commonly, it is used in other religious festivals such as Trinath Puja, a religious ceremony observed also by certain Mohammedan sects in slightly different form. In Puri (Orissa) ganja and bhang are largely used by the attendants and worshippers of Jagannath. In the United Provinces where Durga Puja is observed in a manner similar to that in Bengal, the use of bhang is not so much in vogue. It is, however, taken by certain classes on the occasion of the Holi and Dewali festivals, marriage ceremonies

and other family festivities. Among the Sikhs, the use of bhang as a beverage was quite common 20 or 30 years ago and these beverages were freely distributed to devotees attending some of their religious places and shrines. Drinking of bhang is also in vogue in Rajputana at the festival of Kama (Indian cupid) by the Rajputs of Bondil. In the Central Provinces 'ghota' is used among the lower classes at the time of different festivals. In Bombay, worshippers of Shiva generally use ganja, while the Marwaris and merchant classes who belong to religious sects such as Jains use bhang on festive occasions. In Madras, the use of hemp drugs in religious and social life is less common than in other provinces. Assam is the only province where bhang is used practically not at all at the present time, probably because of the prevalence of the use of opium in that province.

It may be pointed out that charas, which is a foreign product and which has been comparatively recently introduced into India, is not in any way connected with religious worship or observances.

From the foregoing description it is evident that the use of hemp drugs in social and religious customs is still in vogue though it has considerably decreased during the last two or three decades. Even to-day a religious mendicant smoking ganja is not only tolerated but is looked upon with some veneration and is even considered to possess supernatural powers of healing disease and infirmities, by some of the illiterate classes. Sects of 'sanyasis', 'mahantas' 'mantra-data gurus' or religious preceptors are held in great respect although they indulge freely in hemp drugs. In fact, offering of hemp to them is considered to be an act of piety.

(ii) Medicinal uses. (a) Indian hemp in Hindu medicine.—In the Ayurvedic medicine, the first mention of the hemp plant occurs in the work of Susruta written before the 8th century A.D. In this work hemp leaves are recommended along with a number of other drugs as antiphlegmatic, as a remedy for catarrh accompanied with diarrhea and as a cure for fever arising from excess of 'bile' and 'phlegm'. The hemp plant was believed by the ancient Aryans to possess cooling and febrifuge properties. On account of its narcotic properties it was probably also used as an anæstic by the ancient Indian and Chinese surgeons.

(b) Indian hemp in Mohammedan or Unani medicine.—Rumphius (1095 A.D.) in the Herbarium amboinence states that the Mohammedans frequently used the male hemp plant in the treatment of gonorrhomen as a state of the treatment of a condition, popularly called 'stitch in the side'. He also adds that the powdered hemp leaves are stomachic and check diarrhomen and excessive biliary secretion. He mentions the use of hemp as an enema in strangulated hemia, and as an antidote in poisoning with orpiment. In Makhzanul aldawaiya, the well-known Arabic book on materia medica, the author dwells on the wonderful properties of the hemp plant. It is said to be a cordial, a bile absorber, an appetizer, and that its moderate use prolongs life. The powdered bark is recommended as an external application to fresh wounds and sores. A poultice made by boiling the roots and leaves of the hemp plant is prescribed for application to inflamed parts as a cure for erysipelas and for allaying neuralic pains. The oil expressed from the hemp seeds known as 'kandiryak' and is used in Kashmir as well as in certain parts of the Punjab as an application for rheumatic pains.

(c) Indian hemp in western medicine. The introduction of Indian hemp into western medicine may be traced back to the period when Napoleon's expeditionary forces occupied Egypt. In India, O'Shaughnesy in 1839 tried Indian hemp as a sedative of the central

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nervous system in such diseases as tetanus, hydrophobia, rheumatism, chorea, and convulsions in children. Christison also carried out clinical trials in Indian patients and considered it to be an anodyne, hypnotic, and antispasmodic next only to opium. Later, Aaronavical apparent on the same of his patients undergoing surgical operations and they estified that the drug subsequently had some pain-relieving the drug subsequently had some pain-relieving properties. During the period that followed the report of these early workers, Indian hemp was used for its analgesic and hypnotic properties in such affections as asthma, neuralgia, neuritis, migraine, sciatica, myodynia, gastrodynia, enteralgia, tinnitus, dysmenorrhœa, muscular and joint pains, etc. It was also used to relieve the lightning pains of tabes, formation, numbiness, paræsthesia, convulsions, etc. On account of its diuretic and sedative properties a decoction of hemp leaves has also been used in cystitis and urethritis.

(d) Indian hemp in veterinary medicine.—For diseases of cattle, hemp leaves are frequently used mixed with such ingredients as spices, salt or sugar candy. The smoke produced by the burning hemp plant is considered to be a disinfectant for sheep folds Ganja is considered to be a good remedy against intestinal worms and in 'foot sore' disease. Bhang is sometimes used to increase the flow of milk in cows. Bhang mixed with salt is often administered to cattle as a preventive against diarrhea, which is of common occurrence in India during the monsoon months. The use of these drugs is chiefly based on hearsay and tradition.

(e) Indian hemp as a household remedy.—The hemp drugs are popularly used as household remedies in the amelioration of many minor ailments. A mild beverage made from bhang leaves is believed to sharpen appetite and help digestion. Indian hemp is commonly used as a smoke and as a drink for its supposed prophylactic value against malaria in malarious tracts. Bhang beverages form one of the popular household remedies for growthese and dyspusic Operators of their wild for gonorrhea and dysuria. On account of their mild diuretic and sedative properties these drinks probably give a certain amount of symptomatic relief. Likewise, the use of bhang in dysmenorrhæa, asthma, and other spasmodic conditions is not uncommon. A poultice made from fresh leaves is a common household remedy for painful affections of the eyes, conjunctivitis, swollen

joints, orchitis, and other acute inflammatory conditions.

(iii) Use of hemp for euphoric, intoxicating and aphrodisiac purposes.—The habitual use of hemp drugs for the production of euphoria and intoxication is widespread not only in India but throughout Asia and Africa. Africa. According to reports in published literature, it is a fairly common habit in the southern states of the United States of America where it is generally known as 'marihuana'. The rapid development of its use since 1935-1936 and widespread traffic in it has been the source of very great concern to the Bureau of Narcotics. Particularly disturbing is the fact that the victims comprise for the most part members of the younger generations and even boys and girls of school age are not excepted.

These drugs are said to alleviate fatigue and also to increase the 'staying power' in severe physical stress. In India, fishermen, boatmen, washermen, and cultivators who have to spend long hours of the day in rivers, tanks and water-logged fields often resort to hemo drugs in some form on other in the helief that hemp drugs in some form or other in the belief that these will give them a certain amount of protection against catching cold. Mendicants who roam about aimlessly in different parts of India and pilgrims who have to do long marches often use hemp drugs habitually. Sadhus and fakirs visiting religious shrines usually carry some bhang or ganja with them and often indulge in them. It is not an uncommon sight to see them sitting in a sirely and enjoying a smoke of ganja them sitting in a circle and enjoying a smoke of ganja in the vicinity of a temple or a mosque. Labourers who have to do hard physical work use hemp drugs in small quantities to alleviate the sense of fatigue, depression and sometimes hunger. A common practice amongst labourers engaged on building or excavation

work is to have a few pulls at a ganja pipe or to drink

a glass of bhang towards the evening. This produces a sense of well-being, relieves fatigue, stimulates the appetite, and induces a feeling of mild stimulation, which enables the worker to bear the strain and perhaps the monotony of his daily routine of life more cheerfully. The low cost and easy availability of these drugs are important factors in their was by the medical drugs are important factors in their use by the working classes, whose economic condition is low in this country. Hemp drugs are perhaps the only narcotic drugs which fall comfortably within their means and they make use of them as occasion arises. A dose worth two to four pice (½ to 1 penny) is often sufficient for producing the desired effect in a few individuals.

Hemp drugs are also sometimes used to induce a state of intoxication which will excite emotion and give a sense of bravado so that daring acts may be committed. As has been said the Rajput warriors, during their frequent encounters with the Mohammedan invaders in the old days, used to indulge in bhang so that any nervousness present might be banished, and a feeling of determination created either to win or die on the field of battle. This practice is seen even in these days in connection with wrestling contests and athletic sports and games needing great physical effort and endurance. Indulgence in hemp drugs, unlike alcohol, rarely brings the habitué into a state of extreme intoxication where he loses entire control over himself. As a rule, the intoxication produced is of a mild nature and those who indulge habitually can carry on their ordinary vocations for long periods and do not become a burden to society or even a social

Another purpose for which hemp drugs are largely used in this country is for their aphrodisiac effect. The belief regarding their stimulant effects on the sexual organs has been in existence for a very long time. According to the physiological data obtained it is possible that hemp drugs by their action on the higher centres of the brain, may excite ideas and delusions of a sexual nature, but no experimental data are available to show that they have any specific action on the lower sexual centres in the cord or directly on the

organs.

The use of hemp drugs for euphoric, intoxicant, and aphrodisiac purposes, although quite common 20 to 30 years ago, has gradually declined and at the present time it is almost entirely confined to the lower strata of society. Amongst the upper and middle classes, the use of hemp drugs is nowadays considered to be derogatory, in spite of the fact that the practice was held in great esteem in ancient India, and early literature is full of references to the virtues of this

This change in outlook with regard to indulgence in them is not difficult to understand. One reason is that hemp drugs are popular with the lower strata of society which contain a large number of undesirable and criminal elements, and the well-to-do and respectable criminal elements, and the well-to-do and respectable classes are giving them up on account of this association. Another and perhaps a more important reason for the decline of the use of hemp drugs is probably traceable to the peculiar blunting of the sense of relativity in which the idea of time and space may be lost. By affecting the higher nervous pathways concerned in the balanced co-ordination of time and space, the use of Indian hemp, unlike other drugs which produce euphoria, is more likely to place the habitité in an awkward position and bring him the habitué in an awkward position and bring him into ridicule. Behaviour problems are also known to arise commonly with them. These lapses naturally become immediately apparent in social and club life and make the company of such persons undesirable. The upper and middle classes, therefore, abstain from the use of these drugs as far as possible. Whatever may be the reasons for the decline in the use of hemp drugs, statistical data undoubtedly show a marked decrease in their consumption during recent years, especially among the upper classes.

ABUSES OF HEMP DRUGS

The hemp drugs are rarely employed to produce a state of intoxication which is so intense that the

individual may lose all control over himself. Although their habitual use is common, these drugs are not often indulged in to such an extent as to constitute a definite abuse. The deliberate abuse of bhang is met with among certain classes of religious mendicants in this country, their main purpose being to get into a state of frenzy which, according to their traditional ideas, is conducive to mental concentration and communion with God. Such a frenzied state is used as a cloak for creating belief in the minds of the credulous illiterate masses. A large number of religious fanatics in temples and in places of pilgrimage undoubtedly are hemp-drug addicts of long standing.

Another class of people who are prone to abuse hemp drugs are some of the nomadic classes who have no fixed home and who move about from place to place living in small camps by the roadside exposed to all

sorts of inclement weather.

It is commonly believed that bhang drinking is comparatively less harmful than the practice of smoking ganja and charas. There appears to be a good deal of truth in this popular belief. Although the use of bhang as a cooling beverage is encountered in many parts of India and cases of excessive indulgence are not frequently met with, instances of frank abuse and harmful effects following therefrom are as a rule uncommon. This, of course, does not mean that bhang does not produce any deleterious effects on the system. Impairment of digestion is a common occurrence with bhang drinkers of long standing, who take excessive quantities. This naturally results in injury to their general health and vitality. There is definite and demonstrable stimulation of the higher cerebral and medullary centres, but this is seldom intense and, therefore, the harm done is comparatively small. The smoking of ganja and charas on the other hand, although it affects the digestion to a lesser extent, brings about a state of intense intoxication as a result of action on the higher centres in the brain and, if the abuse is continued for a considerable time, it may lead to mental derangement, behaviour problems, crime and insanity. These habits, therefore, constitute an important social problem. Moreover, ganja and charas are possibly more likely to produce intense addiction than bhang. Habitual use of bhang can be discontinued without much trouble but the withdrawal from the ganja and charas habits is accompanied by unpleasant symptoms and is much more difficult, though negligible compared to those associated with drugs like opium

#### PRESENT EXTENT OF HEMP-DRUG ADDICTION

or cocaine.

Total consumption of hemp drugs.—The total consumption of hemp drugs, according to excise returns of 1934-35, amounted to 1,031,496 lb. in British India and this works out approximately at 4.24 lb. per 1,000 of population per annum (census of 1931). The consumption of these drugs in British India in 1912-13 worked out at 15 lb. per 1,000 of population per annum. It will be seen therefore that, during the last 20 years, the use of these drugs has been reduced to nearly a quarter of what it was. When the three preparations, bhang, ganja, and charas, are considered individually, the amounts consumed in 1934-35 were as follows:—

			Seers o	or lb.
Bhang			292,166	584,332
Ganja			162,153	324,306
Charas		••	61,429	122,858
	TOTALS		515.748	1 031 496

The United Provinces consume the largest amount of hemp drugs, the total consumption in that province being 287,926 lb. during 1934-35; next in order come the Punjab, Bengal, Bombay, and Central Provinces.

As regards the incidence of the hemp-drug habit,

Sindh shows the highest incidence with a consumption of 35.12 lb. per 1,000 of population per annum, then comes Delhi with, 23.84 lb., Ajmere-Merwara 14.6 lb., Baluchistan 8.22 lb., the Punjab 7.6 lb., North-West Frontier Province 5.94 lb., United Provinces 5.94 lb., Bombay 4.4 lb., Assam 2.18 lb., Bihar and Orissa 2.2 lb., Bengal 1.6 lb. and Central Provinces and Berar 1.6 lb., respectively:

It is very difficult to form an accurate idea of the number of persons addicted to the three forms of hemp drugs as there are many occasional consumers, and there is no system of registration of addicts. It is only possible therefore to form a very rough estimate of the number of addicts from the total amount of the three preparations consumed and the average dose taken.

The average daily dose of bhang, ganja, and charas has been carefully worked out by us in more than 1,500 addicts. This is approximately as follows:—

		Grains
Bhang	 e in the second	20
Ganja		 18
Charas	 	15

Assuming that the whole amount was used for euphoric purposes and for habitual consumption (the amount used for medicinal purposes being negligible), the number of hemp-drug addicts in the whole of British India at the present time works out to be 855,844, provided only the amount issued by the excise authorities is considered. From the knowledge we have of the situation all over the country, we are inclined to believe that the actual amount is a good deal higher, as considerable amounts of the drugs are obtained from illicit sources, for example by smuggling or from the spontaneous growth, which can be easily utilized.

The hemp drugs are the narcotics most extensively

The hemp drugs are the narcotics most extensively employed by the poorer classes throughout the country because they are cheap and easily available. Extensive work in the field has enabled us to estimate that the incidence of hemp-drug addiction ranges between 0.5 and 1.0 per cent of the total population in British India. The largest number of addicts are in the United Provinces and next comes Sindh. In these areas the use of hemp drugs is not restricted to any particular community and extends even among the middle classes. Charas is not used in Madras, Assam, Bihar and Orissa, and Central Provinces excepting in a few industrial towns such as Ahmedabad and Jubbulpur. Ganja is used to a comparatively small extent in Sindh, eastern districts of the United Provinces and in N.-W. F. Province and Punjab where it is probibiled.

From our investigations in the field, we conclude that a large number of the inhabitants of this vast country take hemp drugs habitually at the present time, that the habit is on the whole declining and it certainly is not on the increase anywhere, that there is reason to believe that during the last 15 years the use of hemp drugs has more rapidly declined than in the previous similar period; the cause of this decline appears to be the tightening of control by government by reducing the area under cultivation and increasing the price

by enhancement of excise duty.

The localities in each province where the incidence of hemp-drug addiction is high are urban and not rural areas. Large industrial towns or large agricultural centres, as a rule, have large labour populations in low economic circumstances. They have to work very hard and they usually indulge in these drugs as cheap euphorics. Thus, in towns such as Calcutta, Bombay, Madras, Ahmedabad, Cawnpore, the consumption is high on account of this large industrial population. The mining areas also show a high incidence, due to the preponderance of labour forces. Burdwan district in Bengal with its large mining industries shows a comparatively higher incidence than other parts of Bengal, with the exception of Calcutta.

Religious centres and important places of pilgrimage also show a bit in the consumption.

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Religious centres and important places of pilgrimage also show a high incidence of the use of hemp drugs. This is due to the presence of hordes of mendicants who collect at such places.

HEMP-DRUG ADDICTION IN DIFFERENT PROVINCES IN INDIA Bengal.-During 1936-37 the consumption of different forms of hemp drugs in Bengal, according to the Excise Reports, was as follows: ganja 64,974 lb., bhang 16,736 lb., and charas 1,452 lb.

The incidence of the use of different forms of hemp drugs is high chiefly in the western zone composed of 24-Parganas, Burdwan, Birbhum, Midnapore, and Hooghly districts. The high consumption in these areas is attributed to large labour forces engaged in various industries such as jute and cotton mills, iron and steel works, coal fields, etc., which abound in this

In most of the districts of East Bengal, the demand for bhang as an intoxicant is very small, but it should be remembered that in these districts bhang grows wild, and it is believed to be extensively used as an illicit substitute for ganja. Further, it will be seen that the consumption is highest in Calcutta and its suburbs. The reason of this is that in the city of Calcutta and its suburbs there is a large labour population engaged in different industrial occupations, whose hygienic and economic conditions are such as to lead the use and abuse of narcotic and euphoric drugs.

Taking the Presidency as a whole the incidence of the use of these drugs is not very high, being only 1.6 lb. per 1,000 of population per annum for all hemp drugs and 1.4 lb., 0.4 lb., and 0.02 lb., for ganja, bhang, and charas, separately. There is no doubt that there is a further decline in these figures.

Bihar and Orissa.—In 1936-37, 57,726 lb. of ganja and 14.470 lb. of bhang were consumed in Bihar. Minor rises occur in the consumption of bhang in the districts of Gaya and Patna, in all probability because of their having places of pilgrimage to which people from other parts of India come in large numbers. The consumption of ganja keeps at a fairly high level throughout the province. The incidence of consumption of total hemp drugs per 1,000 population was 2.2 lb. per annum.

The types of people who use hemp drugs in these provinces are similar to those in Bengal, the only difference being that the incidence of addiction among the middle classes is higher than that in Bengal, particularly in the western districts which adjoin the

United Provinces.

Assam.—Cultivation of hemp drugs is not allowed in Rajshahi in Bengal and of bhang from Bhagalpore in Bihar. The amount of ganja consumed in Assam during the year 1935-36 amounted to 20,245 lb. The incidence was 1,000 people from work to be 22 lb. incidence per 1,000 population works out to be 2.2 lb. The consumption appears to have increased during the last year throughout the province except in Cachar, Sylhet, the Khasi Hills, Jaintia Hills, and the Garo

The consumption of bhang amounted to 60 lb. during 1935–36 which is very small as compared with other provinces. There are only two bhang shops, one in Cachar and another in Sylhet, but the consumption from cachar and another in Sylhet, but the consumption from excise sources is gradually decreasing, due to smuggling from Manipur and the Naga Hills. Permits are also issued to 47 druggists and Kavirajas who are allowed to store the drug for medicinal purposes. Those addicted to hemp drugs are mostly working class coolies and labourers.

United Previous of Agree and Ough The total

United Provinces of Agra and Oudh.—The total consumption of all these drugs in the United Provinces was 287,942 lb. during 1934-35. Of this amount 228,724 lb. was bhang, 42,752 lb. charas, and 16,466 lb. ganja. As regards the incidence per 1,000 population per annum is concerned, it works out to be 5.8 lb. of all hemp drugs and 5 lb., 1 lb., and 0.4 lb. for bhang, charas, and gania, separately.

all hemp drugs and 5 lb., 1 lb., and 0.4 lb. lot blads, charas, and ganja, separately.

Punjab.—Only bhang and charas are used in the Punjab, the sale of ganja being strictly prohibited. Total consumption of hemp drugs in this province during 1935–36 amounted to 179,408 lb. out of which 34,502 lb. was charas and 144,906 lb. was bhang.

The total incidence for the two drugs worked out at 7.6 lb. per 1,000 of population per annum and 1.4 lb.

7.6 lb. per 1,000 of population per annum and 1.4 lb. and 6.0 lb. for tharas and bhang separately.

Delhi province.—As this province adjoins the Punjab and western districts of the United Provinces, the problem of hemp-drug addiction is very similar to these provinces. Bhang and charas are almost entirely used and the supply is obtained from the Punjab. Total consumption of these drugs during 1934-35 was 15,130 lb. out of which 5,702 was charas and 9,428 was bhang. The average consumption per 1,000 population per annum works out at 23.8 lb. and the province stands second in India with regard to the incidence of consumption.

North-West Frontier Province.—The problem hemp-drug addiction in this province is similar to that in the adjoining provinces of the Punjab and Sindh. Bhang and charas are the only two preparations which are used in this province for addiction purposes. Indian hemp grows spontaneously almost everywhere and can be collected without restriction up to the legal limit of 2 lb. per person. During 1935–36, 6,768 lb. of charas were consumed in this province which gives the incidence of 4.2 lb. per 1,000 population per annum. The drug is used by all classes, who are chiefly Mehammeders. Mohammedans.

Bhang is mainly consumed in Bannu and Dera Ismail Khan districts. This is probably because these areas lie on the border of western Punjab districts and Sindh which are both heavy bhang-consuming areas. The total consumption of bhang during the year 1935-36 was 12,242 lb. which gives an incidence of 1 lb. per 1,000 population per annum. The incidence of both forms worked out at 5.2 lb. per 1,000 population.

Sindh.—During 1934-35, 136,480 lb. of hemp drugs were consumed of which 118,660 lb. was bhang, 17,504 lb. charas, and 316 lb. ganja. The consumption of bhang is rather high throughout the province, and

works out at 35.12 lb. per 1,000 population per annum.

Baluchistan.—The total consumption of hemp drugs during 1935 amounted to 3,352 lb., of which 2,164 lb. was charas, 1,186 lb. bhang, and only 2 lb. ganja. The average consumption of all the hemp drugs put together was 8.2 lb. per 1,000 of population per annum.

Bombay Presidency.—The total consumption of hemp

drugs in the Bombay Presidency proper during the year 1936-37 was 79,646 lb., of which 16,214 were bhang, 12,476 lb. charas and 50,956 lb. ganja. Ganja is however the drug of choice, bhang is in little demand and is only used by the Marwari community and people from northern India. The use of charas is prohibited all over the precise execution the theorem. prohibited all over the province except in the towns of Bombay and Ahmedabad.

In this province, taken as a whole, it has been roughly estimated that about 1 per cent of the population use hemp drugs habitually in some form or other at the present time. The incidence of all drugs works out approximately to 4.4 lb. per 1,000 of population per annum. That for ganja, bhang, and charas is 8.4 lb., 2.8 lb., and 0.8 lb., respectively. There appears to be no doubt that, on the whole, habitual indulgence has considerably declined during recent years. considerably declined during recent years.

Central Provinces and Berar.—The total consumption of hemp drugs in this province works out at 1.6 lb. per 1,000 population per annum and that of bhang and ganja to 1.2 lb., and 2 lb.

Coorg.—The amount of ganja consumed during 1935-36 was 318 lb. and the incidence of hemp-drug addiction worked out at 1.8 lb. per 1,000 population

per annum.

Madras Presidency.—The population of southern Madras uses hemp drugs to a lesser extent than that of northern parts. During 1934-35 the total consumption of ganja and bhang amounted to 89,172 lb., out of of ganja and bhang amounted to 89,172 lb., out of which only 12,158 lb. was bhang, the rest being ganja. The total average consumption amounted to 1.8 ib. per 1,000 population per annum. The incidence is somewhat high in Madras and Salem districts, in the former on account of its being an industrial centre and in the latter because it is a rich agricultural centre. The consumption of both ganja and bhang is low in all other districts. The use of charas is practically unknown. There are altogether 544 licensed shops in the presidency. the presidency.

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EFFECT OF HEMP-DRUG ADDICTION ON GENERAL HEALTH

From an analysis of the statements of addicts (1,238) as to whether the general health is affected in any way, we have observed that in about 52.10 per cent no ill effects were admitted. In 24.47 per cent health was believed to be affected to a minor degree and in 14.78 per cent to a marked degree. There were, on the other hand, 8.64 per cent who stated that they had improved in their general health since they took to indulgence in hemp drugs. The last group of persons were mostly those addicted to the use of bhang and who were in the habit of taking small doses in the neighbourhood of 10 grains a day. It is also evident that the evil effects were admitted more frequently in the case of ganja and charas addicts than in the case of bhang addicts, in 65.02 per cent as compared with 23.7 per cent, in this series. Further analysis showed that with increased dosage, the adverse effects were admitted to be more pronounced.

It will thus be seen that the general health may not suffer when hemp drugs are consumed in doses below 20 grains daily; further increase in the dosage is attended with deleterious effects and consumption exceeding 180 grains a day may damage the health seriously and rapidly.

#### Physical effects

Moderate habitual use of ganja or charas may or may not be attended with harmful effects, and in the case of bhang there is evidence that no apparent harm may result if it is taken in moderate quantities. Of all the preparations of Indian hemp, bhang is popularly believed to be the least harmful. According to the Indian Hemp Drug Commission (1893-1894) it is the refreshing beverage of the people, corresponding to beer in England and moderate indulgence in it is attended with less injurious consequences than similar consumption of alcohol in Europe. This view has been corroborated by our own experience in the field.

Bhang drinkers, unlike other drug addicts, are robust and physically well-built individuals. Its moderate habitual use does not lead to malnutrition, on the other hand appetite is said to be stimulated. The cases, in which loss in weight occurs, are probably those who are at the same time addicted to some other pernicious drugs such as opium, cocaine, or alcohol. In a certain number of our cases from the well-to-do and priestly classes, an atonic condition of the voluntary muscles of the body was commonly met with. These individuals were flabby and therefore had a tendency to become obese. The appearance of bhang addicts taking excessive doses is generally sleepy and they often have a vacant look. In about 60 per cent of those indulging in Indian hemp, the conjunctive are congested and have a yellowish-red tinge which becomes intense when the dose is repeated.

The confirmed ganja and charas addicts, especially those taking large doses, often exhibit signs of deterioration of general health. The excessive smokers are thin, emaciated persons with a sallow or muddy complexion, and dull grey eyes. Excessive smoking also produces chronic catarrhal laryngitis and considerable bronchial irritation may result.

The daily repeated dosage of these drugs overburdens the alimentary and excretory-systems, the appetite declines and food is not properly assimilated. The addicts lose weight rapidly and may suffer from general cachexia; the skin becomes pale and dry and is often covered with scales; the nails, teeth and hair. which are often affected, become dry and lose their lustre. The general bodily nutrition suffers, because the money, which should be spent for the purpose of procuring wholesome and nutritious food, is used to buy the drug itself. Impairment of vitality is thus produced. which renders the system incapable of resisting an intercurrent disease. Addicts are generally more sensitive to the vicissitudes of weather than ordinary individuals.

EFFECTS ON THE CENTRAL NERVOUS SYSTEM

The main effect of hemp-drug addiction is on the central nervous system. These effects can be grouped under two headings:—

A. Temporary effects, *i.e.*, those that are only present when the person is actually under the influence of the drug.

B. Permanent effects, i.e., the sequelæ of the

prolonged use of these drugs.

#### A. Temporary effects

Soon after taking a moderate dose by mouth the pulse increases somewhat in fullness and frequency, the face becomes flushed, and there is a feeling of warmth all over the body; the appetite becomes sharpened and there is a tendency to talk. In rare instances aphrodisiac sensations are experienced. The sensation of pain is definitely dulled and there is a feeling of partial anæsthesia all over the body. The pupils are slightly dilated.

With larger doses the above symptoms become more pronounced; the pulse becomes rapid and sometimes irregular at first and slows afterwards. The temperature varies according to whether the individual is excited or depressed. This stage is usually followed by

drowsiness and deep sleep.

Ganja and charas smoking.—The immediate effects of moderate doses in a habitual consumer is the initial feeling of anxiety and restlessness, which is followed by a refreshing and stimulating feeling. The sense of fatigue is alleviated, pleasurable sensations are produced so that the consumer is happy, and congenial towards everybody. Restlessness is removed and there is a quietening effect on the nervous system, which induces a sense of forgetfulness of all mental worries.

The effects in many cases are attended with hallucinations of sight, hearing, and general sensibility. The senses become hyper-acute and more subtle. Disturbance of the sensations of taste and smell may also occur during the later stages. Deep sleep generally follows in the majority of cases an hour or more after indulgence.

There are individuals amongst ganja and charas smokers on whom the effect of intoxication is quite different from that ordinarily obtained. They lose all sense of proportion and

become irresponsible.

Bhang or siddhi' drinking or hemp eating.—Bhang is somewhat extensively used for occasional indulgence and for religious purposes; its symptomatology therefore deserves special mention. The effects produced by this drug are more lasting than those produced by smoking ganja and charas. With moderate doses the individual feels cheerful. The appetite is sharpened. With some there is a sensation of forgetfulness and relief from worries and troubles of life, others get good sleep after the day's hard work, still others feel active and interested in life and their surroundings, after taking a dose.

Most bhang addicts, after a regular dose, become reflex and emotional; the control of the higher centres is lost and the sense of judgment is impaired to an appreciable degree. The stage of intoxication generally lasts from three to five hours and then sleep supervenes. The addict on waking next morning does not experience any marked nausea or vomiting nor are the bowels affected (constipated) as in the case of other intoxicants. Some of the addicts complain of slight dizziness and congestion of the eyes and feeling of heaviness in the head on waking next morning.

Duration of effects. Ganja and charas smoking.—Smoking produces its effects more rapidly than consumption by the mouth because by the latter method the absorption of the resin, which is combined with large quantities of colloidal matter, is considerably delayed from the gastro-intestinal tract. With pure resin absorption is of course much quicker. According to Russell, in the case of ganja smoking the mental effects appear within three to five minutes while in the case of charas they may appear with the first pull from the pipe ('chillum'). In the case of ganja, the effects last from half to one hour or even longer, in the case of charas from 15 to 20 minutes. With bhang the symptoms may set in in from 20 to 30 minutes or may be delayed and may last from two to twelve hours.

#### B. Permanent effects

Mental effects.—Mental injury is more likely to occur in the case of those individuals who take large doses and for prolonged periods.

The effects of different preparations are interesting. Emotional character and judgment are affected more in the case of bhang, while memory

and sleep are more disturbed in the case of ganja and charas. Bhang habitués were also more peevish and hypochondriacal than those indulging in ganja and charas. The incidence of gross injuries to the central nervous system such as insanity and moral depravity appears to be more frequent amongst the ganja and charas habitués than the bhang drinkers. Epileptic fits are, on the other hand, more frequent amongst the bhang habitués.

Effects on sleep.—We are inclined to believe that sleep is disturbed more in the case of ganja and charas addicts and little or not at all in the case of those addicted to bhang. This may be due to the fact that bhang as a sedative has a mild and prolonged action, while ganja and charas have rapid and intense effects in which euphoria and stimulation are more pronounced.

Use of the hemp drugs in relation to mental disorders and crime.-We have come across a few instances of insanity resulting from the abuse of bhang or charas or ganja. The testimony of many of the competent medical authorities in this country also sponsors this belief. The abuse of hemp drugs injures the constitution in the same manner as an excessive indulgence in any other narcotic drug. It does not necessarily produce insanity, except perhaps in those who have predisposition to it. It may, however, lead to rough manners and apathy and extraordinary behaviour on the part of the individual. Those who smoke ganja and charas excessively are often quarrelsome and do not heed the consequences of their deeds. We have examined records of murder and crime cases in jails and mental hospitals and have found that only in a very few instances (1 to 2 per cent) the temporary or the permanent mental derangement induced by hemp drugs was directly responsible

As regards the relationship between hempdrug addiction and crime, there are instances where the addicts committed criminal acts under the effect of these drugs, especially after smoking ganja or charas, under grave provocation or in cold blood and with premeditation. Such instances do not necessarily prove any definite relationship between hemp drugs and crime. Indulgence in alcohol undoubtedly gives rise to a feeling of bravado and courage by depressing the higher controlling cerebral centres, and there are many instances in which it has led to crime of a very grave nature. With regard to hemp drugs, however, the situation may be viewed from a different angle. Hemp drugs are cheap and are generally used by the poorer classes, who belong to the lower strata of society, to which most of the criminals in this country belong. This may be an explanation of the fact that proportionately more consumers of hemp drugs, especially ganja and charas smokers, are found among bad characters than among the population in general. Moreover theassociated poverty of the addicts may lead them to commit thefts and other petty offences, but

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So far as premeditated crime is concerned, especially that of a violent nature, hemp drugs in some cases may not only not lead to it, but they may actually act as deterrents. The result of continued and excessive use of these drugs, in our opinion, is to make the individual timid rather than to lead him to commit a crime of violent nature. Our opinion in this respect, based on the study of a large series of addicts, is that the tendency of the drug appears to be to develop or bring into play the natural disposition of the consumer and to emphasize his true character and peculiarities.

#### Types of hemp-drug addicts

There is nothing inherent in the make-up of a normal individual which draws him towards the habitual use of narcotic drugs. The basic factor underlying addiction is always some defect or abnormality in the mental make-up of the individual. The causes leading to drug addiction are almost identical all over the world. The reasons for which the habit is started are psychological and are sufficiently convincing to the addict himself and he intentionally carries on the habit in spite of being aware of its dire consequences. The addicts in this country can be divided into four main groups :-

Group I.—Persons belonging to poorer classes, such as day labourers, or domestic servants. These people are the principal consumers of ganja and charas. They keep to small doses and as a rule suffer from little or no injury to

their general health.

Group II.—Those individuals who use these drugs in the same way as opium, for their narcotic effects. The members of this group are idlers and persons below average mental equilibrium. Ganja and charas are mostly used by this group and the damage to their health is more perceptible than in the case of group I.

Group III .- Those who use hemp drugs in order to obtain stimulant effects combined with intoxicating effects in the same way as from alcohol. This practice exists mostly amongst

the idle rich

Group IV.—Mostly religious mendicants (sadhus and fakirs) and the priestly classes. Hemp drugs are used in all forms by them in order to overcome the feeling of hunger and in order to help them to concentrate on religious and meditational objectives, and also sometimes by the unaccustomed to excite passion and emotion.

#### SUMMARY AND CONCLUSION

(1) The hemp plant grows wild over extensive tracts in northern India along the southern slopes of the Himalayas, coming well down into the plains. Its cultivation for narcotic purposes is strictly controlled and is confined to selected areas under careful supervision of the excise authorities.

(2) The resinous substance contained in the hemp plant is the active principle responsible for its physiological activity. The resin, as obtained from the plant, contains a number of compounds, one of these being Cannabinol which is probably the active principle. The potency of hemp drugs deteriorates with age.

(3) Charas and ganja are preparations from the same plant and differ in the amount of the narcotic principles they contain; the physiological effects produced by them are similar, differing in degree. Ganja and charas are mostly smoked, while bhang is usually taken by the

mouth in the form of a beverage.

(4) The present use of hemp drugs in India may be considered under three main headings:—(i) use in connection with religious and social customs; (ii) medicinal uses; and (iii) use for narcotic and euphoric purposes.

(5) The use of hemp drugs in order to produce euphoria and mild stimulation, although still common, is gradually declining. It exists mostly at the present time among the lower and work-

ing classes.

(6) As euphorics, hemp drugs, unlike alcohol, rarely produce severe intoxication, especially in those who take them habitually. Abuse of these drugs sufficient to produce intoxication of a pronounced type exists only amongst the idle and vicious classes in the cities and towns.

(7) The total consumption of hemp drugs in British India during the year 1934-35 amounted to 1,031,496 lb., which works out approximately at 4.24 lb. per 1,000 of population per annum (according to the census figures of 1931) as compared with 15 lb. during 1912-13. The United Provinces are the largest consumers of hemp drugs, next in order come the Punjab, Bengal, Bombay, and Central Provinces and Berar, respectively.

Charas is mostly used in the northern and western parts of India, i.e., the North-West Frontier Province, the Punjab and the western districts of the United Provinces. In Sindh, Rajputana, and western districts of the Punjab and the United Provinces, bhang is more commonly used in the form of a cooling and refreshing beverage suitable for the hot and dry summer months. In the rest of India, i.e., Bengal, Bihar and Orissa, Bombay, Madras, etc.,

ganja is the drug of choice.

From the survey we have carried out and from the total consumption of hemp drugs and daily dosage of addicts we have roughly estimated that there are at least between 855,844 and 1,000,000 hemp-drug addicts in this country, i.e., approximately 0.3 to 0.5 per cent of the population of this vast country take hemp drugs habitually at the present time.

(8) The moderate use of ganja and charas may or may not be attended with harmful effects, while in the case of bhang there is definite evidence that no harm may result to the general health with modern may result to the general health with moderate doses. On the other hand confirmed assignment confirmed ganja and charas addicts, especially

those taking large doses, often exhibit signs of deterioration of general health. The daily repeated doses, especially if large, overburden the digestive and the excretory systems with the result that the appetite is lost and food is not properly assimilated.

(9) Hemp drugs are, even at the present time, used as sexual stimulants by the lower classes. They lead to temporary stimulation of the psychic areas, and the mental excitement thus resulting gives the semblance of aphrodisiac effects, especially in those individuals who are sexually inclined.

The incidence of sterile marriages amongst hemp-drug addicts worked out to nearly twice

that of the normal population.

(10) Effects on the central nervous system can be divided into two stages: (a) an initial stage of stimulation and exhilaration, and (b) a stage of depression when the sedative effects become more marked. The effects during each stage are largely influenced by racial and personal idiosyncrasy and may be entirely modified by the individual temperament.

(11) From a careful study of a series of 1,238 addicts we are inclined to believe that continued

and excessive indulgence in these drugs tends to impair the normal functioning of the nervous system, renders the addict incapable of mental exertion, and causes general debility and premature decay.

(12) We have come across a few instances of insanity resulting from the abuse of bhang or charas or ganja. The abuse of hemp drugs injures the constitution in the same manner as an excessive indulgence in any other narcotic drug. It does not necessarily produce insanity except perhaps in those who have predisposition to it.

#### REFERENCE

Chopra, R. N., and Chopra, G. S. (1939). Indian Med. Res. Mem., No. 31. Thacker, Spink & Co. (1933), Ltd., Calcutta.

#### HÆMATOLOGICAL TECHNIQUE

By L. EVERARD NAPIER, M.R.C.P. (Lond.)

and

C. R. DAS GUPTA, M.B. (Cal.), D.T.M.

PART V of this series has been unavoidably postponed this month. It is hoped to resume their publication in July or August.

#### Medical News

#### BOMBAY MEDICAL COUNCIL

Summary of the proceedings of the meeting of the Bombay Medical Council held on the 9th February, 1940

The Council proceeded to consider the complaint by Dr. V. B. Mankad, M.B., B.S., and five other medical practitioners of Ahmedabad against Dr. Ganpatram Gokaldas Patel, M.B., B.S., D.O.M.S. (Lond.), in respect of the charges, viz,

(a) of directly or indirectly procuring, or sanctioning or acquiescing in the publication and free distribution among patients of a handbill or leaflet in Gujarati, the said handbill or leaflet commending or directing attention to the professional skill, services, popularity, amiable temper, the care and caution had by Dr. Patel in the treatment of eye diseases; it was alleged that the mention of Surya Bhuwan Hospital was intended to be an advertisement to solicit more practice;

(b) issuing cards or tickets containing not only the number and name of the patient thereon but also the name and address, etc., of Dr. Patel which, it was alleged, constitute an advertisement:

(c) under the cloak of a semi-charitable eye-clinic, it was alleged, he was carrying on private practice charging only one anna to every out-door patient of the Surya Bhuwan Eye Hospital.

These acts appear, it was alleged, to contravene the provision of clauses (a) and (m) of rule 1 in Section II of the Code of Medical Ethics and clause (a) of section 6 of the Warning Notice.

Mr. C. C. Parikh, Advocate from Ahmedabad, was allowed to appear for Dr. V. B. Mankad, Dr. D. E. Anklesaria, Dr. M. M. Parikh and Dr. M. D. Anklesaria, four of the complainants herein, as a special case.

Mr. G. C. O'Gorman, Bar.-at-Law, and Mr. H. R. Pardiwalla, Bar.-at-Law, instructed by Messrs. Majumdar and Dalal, Solicitors, appeared for Dr. G. G. Patel, the practitioner.

Upon the conclusion of the deliberations, the following resolution was put from the chair:-

'That the facts alleged against Dr. G. G. Patel, M.B., B.S., D.O.M.S. (Lond.), in the Notice of Inquiry have been proved to the satisfaction of the Council.'

The said resolution was declared lost, as a result whereof Dr. Patel was held not guilty of the charges preferred against him in the Notice of Inquiry.

The Council then proceeded to consider the question of amendment of rules 61 and 64 of the Rules of the Council relating to travelling allowance and passed a resolution approving of the amendments recommended by the executive committee in regard to the said rules.

The Council then proceeded to consider the question of recognition of the D.O.M.S. of the College of Physicians and Surgeons of Bombay as an additional registrable qualification and decided to grant recognition to the D.O.M.S. of the College for registration as an additional qualification and further resolved that the same be included in Table (G) of the Bombay Medical

The Council then proceeded to consider the application of Dr. J. N. DeSylva, L.M. &s., for restoration of his name to the Bombay Medical Register and resolved that the consideration of his application be adjourned sine die and that he be asked to submit certified copy of the judgment in the proceedings now pending against

The Council then proceeded to consider a letter dated the 7th August, 1939, from the Secretary, Medical Council of India, forwarding therewith a copy of letter dated the 4th July, 1939, from the Registrar, South African Medical Council, Pretoria, and decided to accept the recommendation of the executive committee that any person whose name is erased from the Register of South Africa where he was formerly a registered medical practitioner for infamous conduct in a professional respect should not be entitled to have his name entered in the list of the Bombay Medical Register, provided the Medical Council of the said country

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notifies to this Council the name of such a medical practitioner, until such time as the registering Council shall otherwise intimate and that this rule be laid down by the Council provided that the South African Medical Council is also prepared and willing to reciprocate with this Council in the like manner.

#### INDIGENOUS DRUGS INQUIRY

ADVANCE in knowledge of the pharmacopæial and allied drugs produced in India and development of local drug manufacture, bringing prices within easy reach of large masses in India are some of the achievements large masses in India are some of the achievements claimed for the study, of a large number of Indian medicinal plants under the Indigenous Drugs Enquiry, financed by the Indian Research Fund Association The study ranged over a wide field from the isolation of the active principles to tests of action on animals and, in suitable preparations, on patients.

A number of manufacturing firms have come into existence and instead of concentrated extracts which

existence and instead of concentrated extracts which were formerly imported, practically all kinds of galenical preparations, powders, etc., are now being manufactured in India, in many cases, from material locally produced. The growth of the pharmaceutical industry has, in its turn, stimulated the manufacture of solvents such as alcohol, chloroform, ether, benzene and many coal-tar

products used in medicine.

There is now greater demand for indigenous raw material and with this increase in demand, there has been an increase in the area under drug cultivation.
Belladonna, digitalis, hyoscyamus, squills, colchicum
gentian, artemisia, juniper, valerian, podophyllum,
colocynth, ephedra, pyrethrum, etc., are a few of the drugs which have come into more extensive use. Raw products of good quality are now more easily available at reasonable prices and the export of crude drugs such as belladonna, ephedra, podophyllum, chaulmoogra, castor oil seeds, etc., has gone up considerably.

Attempts are being made to grow the plants in such

Attempts are being made to grow the plants in stona a manner that the maximum quantity of active principles can be obtained, while to overcome difficulties in identification, a herbarium of medicinal plants is being got ready. Digitalis, ipecacuanha, pyrethrum are some of the important drugs, the cultivation of which is being thus encouraged. It is hoped that with proper development, India will not only be able to meet her requirements of medicinal herbs and drugs but also have a large residue for export.

The researches have done much to prove or disprove, by the application of modern methods, the therapeutic value of many drugs used in indigenous medicine. Of the drugs, the efficacy of which has been proved, Isabgul (Plantago ovata), Kurchi (Holarrhena antidysenterica), Sarpgandha (Rauwolfia serpentina), Babchi (Psoralia corplifolia), Kuth root (Saussurea lappa), cobra venom, are a few which may now be admitted into the Indian Addendum to the Pharmacopæia and, later, into the Indian Pharmacopæia. On the other hand, a number of drugs, which were in the old addendum, have been

shown to be worthless

As a natural corollary to work on the medicinal plants, a systematic study has been undertaken of the poisonous plants growing in India. The work is of importance not merely to the medical profession, but also to the veterinarian and to those interested in livestock. The toxic effects of plants in common use, such as aconite, barringtonia, calotropis, nerium, etc., have been worked out, and steps taken to warn people against their indiscriminate use by unqualified practitioners.

Some common food poisons, such as Khesari dal (Lathyrus sativus), Indian millet (Sorghum vulgare), Sialkanta seeds (Argemone mexicana), which have been responsible for serious outbreaks of poisoning in men and animals, have also been studied. Only the fringe, however, of this vast problem of poisonous plants and food poisons have so far been touched.

Investigations have also been made on the diagnosis.

Investigations have also been made on the diagnosis and treatment of such diseases as malaria, amoebic dysentery, kala-azar, filariasis, diabetes, etc. In order to find out whether climatic factors and variability of

the strains of parasites make any difference in the effectiveness of drugs, indigenous drugs as well as drugs and synthetic preparations manufactured in India and abroad have been subjected to careful tests. The minimum effective doses of antimalarial and other drugs, required to bring about disinfection of the patient in a reasonably short time, are being worked out, so that treatment may be carried out with the minimum of expense.

The Indian Indigenous Drugs Enquiry was started in 1926 at the School of Tropical Medicine, Calcutta, with its well-equipped pharmacological and chemical laboratories, where the chemical composition of crude drugs could be determined and their biological action on living tissues evaluated. The clinical testing of drugs were carried out at the Carmichael Hospital for Tropical Diseases which is attached to the Tropical School as its research hospital, the only one of its kind

in the East.

The main objects which the enquiry had in view, were to make India, as far as possible, self-supporting in her supply of drugs by making possible the utiliza-tion of indigenous drugs in a form suitable for administration; to discover remedies suitable for application by exponents of Western medicine from among those claimed to be of high value by Ayurvedic, Tibbi and other indigenous systems of medicine; to find means by which efficacious remedies could be brought within the reach even of the poor, and finally to prepare an Indian Pharmacopœia.

an Indian Pharmacopeeia.

The Indigenous Drugs Enquiry brought to light the true state of affairs with regard to the quality of drugs on the market in India and, eventually, led to the appointment of the Drugs Enquiry Committee and finally to the establishment of the Biochemical Standardization Laboratory of the Government of

India.

The pioneer work of the Indian Research Fund Association has also given an impetus to research on Indian medicinal plants in many places in India. Investigations have been started in the universities and colleges at centres such as Calcutta, Bombay, Dacca, Patna, Allahabad, Lahore, Madras and Trivandrum.

MEETINGS OF THE UNITED PROVINCES MEDICAL COUNCIL HELD ON 17TH NOVEM- , BER, 1939, AND 18TH MARCH, 1940

THE Delhi Medical Association's resolution, dated the 11th March, 1939, regarding immigration of foreign medical practitioners into this country, was considered and the council passed the following resolution:

'The United Provinces Medical Council strongly profests against the immigration into this country, was considered and the council profests against the immigration into this province of

protests against the immigration into this province of foreign medical practitioners, not registrable anywhere in the Empire—nuch less in these provinces, also against the fact that no bar has so far been placed

against their practising medicine and surgery.
This council unanimously recommends This council unanimously recommends to the Government to take early steps in the shape of adequate legislation to (i) prevent unrestricted immigration of such practitioners for the purpose of practice into this province and (ii) to the purpose of practice into this province and (iii) to the purpose of practice into this province and (iii) to the purpose of practice into this province and (iii) to the purpose of practice into this province and (iii) to the purpose of practice into this province and (iii) to the purpose of practice into this province and (iii) to the purpose of practice into the purpose of practice into this province and (iii) to the purpose of practice into t into this province, and (ii) to prevent them from practising in the United Provinces since they are neither

registered nor possess any registrable qualification.

In this connection, the council brings to the notice of the Government the fact that Indian Nationals are not allowed to practice in the council brings to the council brings to the council brings to the notice of the Government the fact that Indian Nationals are not allowed to practice in the council brings to the cou not allowed to practise in their countries of origin even

if they have qualified as doctors in those very countries.

Further, this council views with great disfavour the association or covering of unregistered foreign medical practitioners by the medical distance. practitioners by the medical practitioners registered under the United Provinces Medical Act.

In view of the influence of th

In view of the influx of many men who practise medicine and surgery and about whose qualifications nothing is known, the question as to what constitutes an unqualified person was according to

an unqualified person was considered. The question of restoration of the name of Dr. Kanhaiya Lall, L.M.P. (Reg. no. 2957) was considered and it was resolved that his name be restored free of charge and with the constant of the free of charge and without any affidavit.

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The question of restoration of the name of Dr. Ram The question of restoration of the name of Dr. Ram Saran Das Bejal, L.M.P. (Reg. no. 729) was considered and it was resolved that his name be restored provided he submitted an affidavit to the effect that he was the person who was originally registered under certificate no. 729, but no affidavit to the effect that to his knowledge no proceedings for removal of his name were ever taken against him be obtained. It was further resolved that this practice be followed in similar assess. resolved that this practice be followed in similar cases

Resolved that the name of Dr. Ram Saran Das Bejal (Reg. no. 729) be restored to the medical register. free of charge and without obtaining any declaration, as the case is known to Captain Bagchi. Resolved further that no rules on the point are necessary but in future each such case be referred to the council to be judged on its merits, while the Bengal procedure be followed in the restoration of names removed for want of address. Rest of the minutes be confirmed.

Resolved that the name of Dr. Ivy Keess, w.m.s.

(Reg. no. 1963), be restored without obtaining a declaration and free of charge, as she is known to obtaining (Reg.

Dr. Caul.

The action of the President in requesting Government to prosecute, under the Indian Medical Degrees Act, (i) Midwife Mrs. Bala Saxena (née S. Dass) and (ii) Mr. S. S. Singhal, Director, The Indian Medical Society, Aligarh, was confirmed, and it was resolved that that it may be pointed out to Government that this council has no powers to deal with the case of Mr. Singhal in the powers are set at the case of Mr. Singhal in the manner suggested and that Government should be requested to take further action in the

Resolved that the State Medical Faculty be informed that this council is prepared to restore the name of Mr. Mahmud Ali (late Reg. no. 840) to its medical register if the State Medical Faculty restore his diploma. Mr. Mahmud Ali may then be asked to comply with the formalities.

The report of the Standing Committee, which met on 28th February, 1940, was considered to approve their

recommendations.

Recommendation no. 1 was accepted subject to the following changes and it was decided that the Bombay Medical Council be informed:

(i) Delete the following paragraph from the footnote proposed to be added to item 1(c) of the Code of

Medical Ethics, viz:

'The United Provinces Medical Council takes a similar view of the association of a medical practitioner with any system or method of treatment which is not under medical control and which is advertised in the public press.

(ii) The last paragraph of the proposed footnote should read as follows:—

'In the above findings the United Provinces Medical Council does not pretend to interfere with the right a medical practitioner to be associated (save as above) with any legitimate business enterprise but if such enterprise concerns the sale of a medicine or food the practitioner should not allow his name, professional status or qualifications to be used for advertising purposes outside the medical press.'

Resolved that this council recommends to the Government and the Agra University that while constituting the Agra Medical College they should consider the desirability of affording opportunities to the Licentiates for obtaining the M.B., B.S. degree. This council should be given an opportunity to submit its proposals on this point before their arriving at a final decision.

ST. JOHN AMBULANCE AND RED CROSS

THE ANNUAL GENERAL MEETING OF THE ST. JOHN AMBULANCE ASSOCIATION AND INDIAN RED CROSS SOCIETY, HELD ON 26TH MARCH AT THE VICEROY'S HOUSE

THE Viceroy said 'India has not escaped the infection of the discords and rivalries which have disfigured the world's history and retarded its progress of late.

Amidst all these, and in contrast to them, it is heartening to see two Societies, both of which had their beginnings in the strong desire to relieve the toll of suffering caused by war, going steadfastly forward, hand in hand without competition, confusion or discouragement, jointly dedicated to the service of humanity,

which so sorely stands in need of it to-day.

The work which your Societies have done in peace is admirable, but, inevitably, it is in time of war that the test and the strain is heaviest. It was therefore with particular attention that I read the reports and listened to the interesting summaries which have just been presented to us by Sir Ernest Burdon and by General Jolly of the work that has been accomplished during a year in which we have been living partly under the shadow of imminent war and partly in a state of war itself.

There is every cause for satisfaction with the work that these reports reveal, and especially the report of the Central Joint War Committee. It was no small task to bring the Mobilization Plan so smoothly into operation, and those responsible for it, both at Head-quarters and on the Provincial Committees, fully deserve the compliments which have been paid to them in the speeches we have heard. I am happy to feel that the work so well prepared and begun is continuing with the work so wer prepared and began is continuing with the smooth efficiency we should expect under the able guidance of the Red Cross Commissioner.

The work of the Joint War Committee involves a close co-operation with Army Headquarters, and it was

in that sphere that the willing help and counsel of General Tabuteau, whose loss we mourn to-day, made itself particularly felt. I will not add to the tributes you have already heard paid to him, except to say that no one more richly deserved the honour recently conferred upon him of admission to the rank of Commander of the Order of St. John.

It is a matter of regret to all of us that this is the last Annual General Meeting which Sir Ernest Burdon will be attending. Three years ago, the first of these meetings over which I presided, was also the first at which Sir Ernest was present as Chairman St. John Ambulance Association and as a Knight of Grace. His energy, his balanced judgment and his ripe experience have combined to make him the ideal Chairman and Chief Commissioner. We shall miss him very much.

Mr. Badenoch, whom I have nominated to succeed him as Chairman, needs no introduction either to you or to the work and responsibilities which await him. As Honorary Treasurer of both organizations he has already to his credit much valuable work, and I am sure that he will prove an able successor to Sir Ernest Burdon.

I feel sure, too, that you would wish me to welcome to-day, on your behalf, General Jolly, to this his first General Meeting as Chairman of the Indian Red Cross

Dealing, first, with the St. John Ambulance Associa-tion and Brigade, I was delighted to hear that 1939 had been a record year of achievement, both in the field of instruction in First Aid and Home Nursing, and in increase of membership of the Brigade. Eight thousand members does not sound a large number in this country of hundreds of millions, but it represents a leap forward in membership by 60 per cent in one year. For this the war is no doubt responsible. but war or no war, let us hope that this increase will have set the standard for the years to come, for India has and will always have need of as many trained workers, as she can get, of the type that are found in the St. John Ambulance Brigade. It is a matter of great satisfaction that the organization of the Brigade on a territorial basis coinciding with Provinces, under the control of heads of Civil Medical Departments, has been completed. This arrangement, I am sure, will greatly assist to maintain the efficiency of the Brigade

We may hope that there will be no call in India to put into practice A. R. P. and anti-gas training provided by St. John Ambulance, but the importance of having

ready a supply of volunteers skilled in such measures

needs no emphasis from me.

Mobilization Plan and the formation of the Joint War Committee made it inevitable and proper that the Red Cross and St. John Ambulance should share the burden of and the credit for much that has been accomplished during the past year. In particular I would like to mention the Women's Auxiliary Corps in Bombay the numerous work parties that have been in Bombay the numerous work parties that have been formed up and down the country, typical of which is the party that works so zealously here in Delhi under the guidance of Lady Cassels, and the organization of a Voluntary Aid Service of Nurses to supplement the Nursing Branch of the Army Medical Services. These are all solid achievements of great value, within the scope of both organizations.

Let me mention now some matters which pertain more particularly to the Indian Red Cross Society. I was most interested to hear of a Blood Transfusion Service in Bengal. This is an example which I hope

will spread.

I hope, too, that the donation from the British
National Institute for the Blind, which has been spent National Institute for the Bind, which has been spent upon education work on the prevention of blindness, is a seed that will multiply a hundredfold. My appeal for funds for St. Dunstan's Hostel, and Sir Clutha Mackenzie's recent tour of India (though St. Dunstan's, of course, works only for the war blinded) have, I think, roused interest in the grave problem of blindness in this country and have perhaps inspired the hope that much might be done here by way of prevention, cure and after-care, in co-operation with the great institutions which already exist outside India for the purpose.

It is gratifying to note that the Society in India has Lt is gratifying to note that the Society in India has been able to extend help to other parts of the world, which stood in need of it, and that two nurses in India have been awarded by the International Red Cross Committee the distinction of the Florence Nightingale. Medal. This, and the fact that the war has not yet curtailed the normal peace-time activities of the Red Cross in India, betokens good organization and reserves of strength. But there is no doubt that those reserves of strength. But there is no doubt that those reserves still need most urgently to be built up both in members and in funds, against a severer testing time which may yet be in store. The response by the public to my appeal for funds for the Red Cross and St. John Ambulance—which was greatly assisted by the willing co-operation of the Press—has been generous, especially contained the claims of other War Funds. But there considering the claims of other War Funds. But there I feel sure that if and when the greater need arises it will be found that the springs of public support in India have barely yet been tapped.

War is an evil thing, but out of war have arisen such symbols as the Red Cross of Geneva and the eightpointed White Cross of St. John of Jerusalem, the arms of which represent the virtues of prudence, temperance, justice and fortitude. These are ancient symbols, and they have undoubtedly helped to lead the world along the paths of humanity and progress. The shadow of another symbol, not so humane, is now brooding over our civilization. When it has passed, mankind will still need the services of those who work under the Red Cross and the Cross of St. John; they will not be found wanting, and they will come to their work, I know, with strength renewed and with their chivalry

untarnished.

#### Current Topics

#### The Use of Colloidal Aluminium Hydroxide in the Treatment of Peptic Ulcer

By JOHN F. McINTOSH

COLIN G. SUTHERLAND

(Abstracted from the Canadian Medical Association Journal, Vol. XLII, February 1940, p. 140)

In recent years there has been a tendency to avoid the use of absorbable alkalies in the treatment of peptic ulcer, and to search for antacid substances which do not affect the acidbase equilibrium of the body as a whole. Among these newer substances may be mentioned mucin, magnesium trisilicate and colloidal

suspensions of aluminium hydroxide.

The use of aluminium hydroxide in the treatment of peptic ulcer was introduced in 1922 by Roch, who reported favourably on its clinical use. Since this time reported favourably on its clinical use. Since this time a considerable number of clinical articles have been published. All of these have been favourable, and all attest to its value in relief of symptoms. Careful studies of its mode of action have also been made. The direct effect of the drug in controlling the acidity of the stomach has been studied by several authors. A recent paper by Bennett and Gill presents clear-cut evidence that the free hydrochloric acid of the gastric secretion can be completely and continuously evidence that the free hydrochloric acid of the gastric secretion can be completely and continuously neutralized by its use. It is well established that aluminium is not absorbed from the alimentary tract. It has been shown that its use does not lead to alkalosis or other disturbance of the acid-base balance of the body. By inference one would expect that its ingestion would not be followed by 'rebound' acidity or hypersection of acid, and it is generally agreed that such is the case. Indeed, Babkin found an inhibition of gastric secretion in dogs as an after-effect, rather than an increase. Similarly Einsel has presented evidence that prolonged ingestion of aluminium hydroxide cream by ulcer patients leads to a marked diminution in titratable gastric acidity after alcohol stimulation in comparison with acidity curves determined before treatment was begun. Woldman and Rowland have introduced a method of administration through a nasal catheter which has considerably increased its effectiveness in intractable cases and in

hæmorrhage. The present report is based upon the clinical use of an aluminium hydroxide preparation in 38 cases of peptic ulcer, some of them from the Out-patient Services, the others from the medical wards. The group comprises all the cases which wards absorvation comprises all the cases which came under observation during a certain period, and in which the drug was used in adequate dosage for at least a week. Cases in which the diagnosis which the diagnosis of peptic ulcer was in reasonable doubt have been excluded, as have cases in which ulcer was established but uded, as have cases in which ulcer was established but uded, as have cases in which ulcer was established but under the control of t was established but in which there was reason for attributing the symptoms to some associated condition, such as permanent pyloric obstruction or gall-bladder disease. A synopsis of the groups of cases and results of treatment is given in table I of treatment is given in table I.

TABLE T

Group		Success- ful	Unsuccess- ful	Total
1 2	Out-patients Ward cases, uncom-	7 18	0 1	7 19
3	plicated. Cases with gross hæmorrhage.	. 9	1	10
4	Cases complicated by infection.	0	2	_
	Totals	34	4	38

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Group 1. Out-patients.—This group of cases, seven in number, comprises six cases of duodenal ulcer in number, complises six cases of adodenal ulcer without complications, and one of jejunal ulcer, all proved by x-ray examination and showing evidence of active ulceration. The patients were allowed to follow their usual occupations throughout the course of treatment. In some cases frequent feedings were advised, with milk freely used as an 'interval' feeding; as improvement occurred, three regular meals were instituted, with restrictions. Aluminium hydroxide was prescribed, usually as two drachm doses, at first six times a day, later two or three times a day, as improvement occurred. All of these did well.

Several points of interest arise from the consideration of this small group of ambulatory cases. The patients took the preparation readily, and, even when due allowance is made for the possible effects of suggestion, seemed to experience marked symptomatic benefit. Five of the seven cases were re-examined after treatment had been continued for several months, and in none of these did an ulcer crater persist. In one case, in which an exploratory operation was carried out some time later, there was operative proof of cure. Only one complaint arose from the use of aluminium hydroxide. Several complained that it caused constipation. This was not sufficient to interfere with continuation of treatment, and was easily controlled by mineral oil. The literature makes frequent mention of this effect of the drug.

Group 2. Ward cases, uncomplicated.—This group of 19 comprises 15 cases of duodenal and 4 of gastric ulcer. Five were recent but the majority were of long standing. The average duration of the 14 chronic cases was ten years. Cases with intestinal obstruction or permanent pyloric obstruction have been eliminated, although six which showed some degree of gastric delay have been included. These cases on the average are more severe and intractable than the ambulatory cases in group 1. Hospital stay varied from one to ten weeks though two to three weeks was the usual duration, not long enough to reach an opinion as to the final outcome of treatment. Some have been followed as out-patients and others by questionnaire, so that further information is available in ten cases.

The diet and dosage of aluminium hydroxide used in this group will be discussed below, along with the other this group will be discussed below, along with the other groups of hospital cases. As to the immediate effect of treatment this was very satisfactory. Pain was relieved usually in the first two or three days, and usually without the use of atropine or other drugs. It is difficult to apportion the benefit from bed rest, diet, and medication in judging this group of cases, except as a matter of personal judgment. With this qualification we may say that the immediate effect of the drug was very satisfactory indeed and comof the drug was very satisfactory indeed and compared favourably with any other form of medical treatment. On discharge all the patients were considered improved.

In eight of the ten cases in which follow-up information is available, progress has been satisfactory, although only one patient has been able to give up treatment altogether. One, under observation in the out-patient deposit part has suffered a requirement of out-patient altogether. One, under observation in the out-patient department, has suffered a recurrence of symptoms. She has stopped taking aluminium hydroxide on account of constipation, preferring an antacid which has a laxative effect. The tenth case must be regarded as a failure of medical treatment although the immediate effect was considered to be good.

Group 3. Cases with gross hamorrhage.—This group comprises nine cases of duodenal and one of gastric ulcer. One patient had no symptoms before the hamorrhage which caused his admission. Like the previous group, the average duration of the chronic cases was ten years, and the usual hospital stay two or description of the chrome cases was ten years, and the usual hospital stay two or three weeks. Two of the cases were given Meulengracht's diet, the others 'bland', or Sippy diets. Aluminium hydroxide was given by mouth usually every two hours, in one or two drachm doses. With one exception all the patients in this group did well. Hæmorrhage ceased, pain when present was relieved,

and all were able to leave hospital improved.

This series of ten cases is too small to reach a final conclusion as to the value of aluminium hydroxide given orally in the treatment of gastric and duodenal Woldman has reviewed the mortality hæmorrhage. rates reported in eight recent series of cases of hæmorrhage, and in these the fatalities have ranged from 10.7 to 22.6 per cent. In his own control series of 38 cases there were 11 deaths—a mortality of 28.9 per cent. Hence among our cases one to three deaths might have been expected, although none occurred.

Until recently medical treatment of hæmorrhage in peptic ulcer comprised starvation—withholding all solids and giving only ice-water by mouth, in order to avoid dislodging the clot by food or peristalsis. Meulengracht deserves great credit for breaking with this tradition, and allowing liberal meals to his cases of hæmorrhage; by so doing he reduced the mortality rate in his wards from 7.9 to 1.5 per cent. Alvarez and Carlson suggest that the food neutralizes the acid of the gastric juice, and so protects the clot in the aperture of the bleeding vessel from digestion. Woldman points out that the optimum acidity for peptic digestion is between pH 2 and 3; about pH 5 the power of pepsin to digest protein disappears; and that blood clot placed in a test-tube with fresh gastric juice is protected from the digestion by collected and the collection by collected and the collection by collected and the collection by collected and the collected and the collected and the collected are the collected and the digestion by colloidal aluminium hydroxide, even at body temperature. This is the basis for the 'drip method' which he introduced, which aims at complete and continuous neutralization of gastric acidity. In 21 cases of gross hæmorrhage treated in this manner he was able to report complete recovery in every instance. Comparing his results with those of our series, it would appear that Woldman's method is to be preferred to oral administration in cases of peptic ulcer which present this complication.

Group 4. Cases complicated by infection.—The two cases in this group were very much alike. Both were in males in the fourth decade suffering from duodenal ulcer; one was complicated by chronic otitis media, the other by chronic pansinusitis. Aluminium hydroxide treatment over a period of months was unsuccessful in both instances. The experience with these two cases is in sharp contrast with the outcome in the preceding groups. It is well known that manifest infection of this type is a serious obstacle to healing, and calls for vigorous attention. In retrospect it seems that it was a mistake to attempt ambulatory treatment in these two cases, and that bed rest should have been advised, along with aluminium hydroxide administered by Woldman's 'drip method'.

#### DISCUSSION

The dosage of aluminium hydroxide used in these cases was either one or two drachms. Statistical examination shows that there is no advantage in the larger dose. It is difficult to generalize about the frequency of dosage. Thrice daily seems often enough to control symptoms and promote healing in some cases. In others it seems wise to begin with six doses a day, or even a dose every two hours. On the other hand there is an advantage in cutting down dosage as soon as the symptoms are under control, in order

to avoid any tendency to constipation.

The difference in the properties of aluminium hydroxide and the readily soluble alkalies makes it important to consider the time of administration. The latter are commonly given about an hour after the meal, in order to control the peak of acidity. Aluminium hydroxide reacts rather slowly with acids, and much of its efficacy is lost if given an hour after food. Some of the patients discovered this fact for themselves, and preferred to take it immediately after eating. It is probably still better to give it half an hour before the meal, as advised by Kreis. Ivy has called attention to the fact that the aluminium combines with the gastric mucus to form a flaky precipitate, which adheres to the mucosa of the stomach and duodenum. A film of this nature would serve as a physical protection to the mucosa and exert an antacid action as well. Hence it seems logical that

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the drug would have its best effect when given on an

empty stomach.

No definite conclusion can be drawn from these No definite conclusion can be drawn from these cases as to the type of diet best given in conjunction with aluminium hydroxide, as failures were equally distributed between diets of the Sippy type, and the hospital 'bland' diet. It is fair to raise the question whether there is any need for diets of the Sippy type and the undernutrition incidental to their use, when the gastric secretion is modified by the presence of aluminium hydroxide.

From studies of the observiced conversition of the

From studies of the chemical composition of the blood it is clear that there is no tendency to alkalosis or nitrogen retention, such as sometimes follows the use of soluble alkalies. If alkalosis is already present the carbon dioxide combining power tends to fall towards normal. Bennett and Gill have been able to put this preparation to a more rigorous test than it received in our cases. They were able to give two ounces daily to a patient with renal failure, without increase in the alkali reserve.

In this series of cases the symptomatic effect of aluminium hydroxide has been highly satisfactory, and bears out the claims made for it in the literature. Its curative effect is probably measured fairly well by its value in relieving symptoms. If this is true it is fair to ask why so many patients state that they cannot give up its use, when they claim to be symptom-free. It is probable that fear accounts for the desire to continue its use. For this fear, of course, there is good basis, and occasional doses after dietary indiscretions or warning symptoms are probably of value in prevent-

In this series there have been four definite failures a 38 cases (10.5 per cent). Einsel reported nine failures in 110 cases (8.1 per cent), while Jones reported one failure in a group of 24 cases (4 per cent). In the cases recorded as failures, the failure in a group of the cases recorded as failures, the failure is the failure of the failure in the cases recorded as failures the failure in the failure is the failure of the failure in the failure is the failure in relief was usually not satisfactory from the first. It is possible that some of these would have responded better to Woldman's method. It seems reasonable to consider that cases which have severe symptoms and long histories, and cases with radiographic or other evidence of penetrating ulcers should be treated in this manner,

as well as cases with severe hæmorrhage.

CONCLUSIONS

It seems justified to conclude that aluminium hydroxide offers many advantages over the older remedies in the treatment of peptic ulcer and that its properties are such as to call for reconsideration of the principles involved. Hitherto, conventional treatment has been based upon a regimen of small meals, frequent feedings, the use of absolvable substitute of the principles involved. has been based upon a regimen of small meals, frequent feedings, the use of absorbable alkalies to control acidity and of atropine to control secretion. Each of these measures has its disadvantage. There is good evidence that frequent feedings are an undesirable stimulus to gastric secretion, and that absorbable alkalies lead to 'rebound' acidity. It is fair to say that treatment by conventional methods has been a disagreeable ordeal, frequently made worse by hunger, deficiency states, and the symptoms of atropine poisoning. poisoning.

poisoning.

It is evident that aluminium hydroxide has proved itself to be a highly effective antacid without danger of 'rebound' activity. Although it may be used in conjunction with frequent feedings, these are no longer required to control acidity, and one may safely dispense with them if sufficient hydroxide is given. There is evidence that the drug has a tendency to inhibit gastric secretion when given over a considerable time. Finally its use is compatible with the present-day tendency to give more generous meals during treatment.

#### Treatment of Infected Burns

By B. C. MURLESS, M.B., B.ch., F.R.C.S. (Edin.), M.R.C.O.G.

(From the *Brit. Med. Journ.*, Vol. I, 13th January, 1940, p. 51)

° The literature on the treatment of burns is legion. A great number of publications followed the introduction

of the use of tannic acid by E. C. Davidson of the Henry Ford Hospital, Detroit, in 1925, which has revolutionized this branch of surgery. Many writers since have published modifications of the original techsince have parameters showing excellent results. It is therefore with some trepidation that I venture to add to a subject so extensively investigated. tremendous increase of burns in war-time surgery may however, render this short article of interest now, and the somewhat rare opportunity of treating and watching the progress of eighteen cases of severe burns from one of His Majesty's ships seems worth recording,

#### THE USE OF TANNIC ACID

The functions of tannic acid are twofold. First, in the early stages it prevents the absorption of toxins by combining with proteins and their metabolites to form a coagulum; and, secondly, the coagulum formed exercises a protective action. Suffering and shock are prevented by the protection of exposed nerve endings, but equally important is the effect of the coagulum in rendering the surface free from outside disturbance and guiding the

growth of the new epithelium.

For practical purposes a burn may be considered like any flesh wound, healing proceeding most rapidly in the absence of bacterial infection. Such conditions are of course ideal for tannic acid treatment, the burnt area being rendered aseptic by cleaning before the tannic acid is applied. In war time the difficulties of thoroughly cleansing burns are many, and delay must often occur. Severe shock may contra-indicate anæsthesia or any active treatment; transport difficulties are bound to delay the arrival of cases at the theatre. Consequently, though they may have received preliminary treatment, many burns met with under war-time conditions must be of the septic variety, and it is with such cases that this article is concerned.

#### TANNIC ACID IN SEPTIC CASES

Burns which have been left for forty-eight hours or more may be considered septic, as no amount of treatment with ether or spirit will render them surgically clean. Difference of opinion exists as to the use of tannic acid in septic cases. Some surgeons prefer pieric acid dressings unless the burn has been cleaned within forty-eight hours. Hamilton Bailey states that tannic acid treatment may be instituted as late as seventy-two hours. The cases reviewed here may help to support the contention that there is no time limit after which tannic acid treatment should be abandoned, and that good results may be obtained by its use where sepsis is fully established. is fully established.

When applied to a septic surface tannic acid will form a coagulum more readily than on a surgically clean area. A crust soon dries which, if it stays in place and can be kept hard, will supply the rest and protection essential for the healing of the inflamed tissues beneath. Such treatment may be compared with that adopted by Winnett Orr for open fractures and by Dr. J. Trueta for infeated wounds in Spain. The by Dr. J. Trueta for infected wounds in Spain. The essential advantages of this method are that the surface remains undisturbed, the covering allowing epithelium remains undisturbed, the covering allowing epithelium to grow in from the edges, at the same time preventing the formation of fibrous tissue and piled-up granulations, which are nearly always seen when infected burns have been treated by constantly changed dressings. The speed of epithelization with such treatment is infinitely greater than when the surface is disturbed daily, and the saving of pain and discomfort to the patient beyond estimation.

PUS FORMATION

Pus will usually collect beneath the crust and may be form in patches, or almost the whole crust may be slightly raised and fluctuation may be present. The usual teaching of removal of or incision into the coagulum under such circumstances was not adopted in these cases. If an expectant attitude is taken, within in these cases. If an expectant attitude is taken, within twelve hours the pus will always find its way out at some point. It may come through cracks in the coagulum, especially at joint flexures, or may ooze out

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at the edges. After discharging for a short time suppuration will cease, and any part of the crust which has become softened may be resprayed with tannic acid and dried. Not unnaturally the smell during the suppurative phase is somewhat unpleasant, but it is not nearly so bad as that encountered in the closed treatment of infected fractures.

## FEVER AND PAIN

Nearly all cases register a rise in temperature during this treatment. It may reach as high as 104°, but this should not cause undue anxiety, and should not be considered an indication for removal of the coagulum. In most cases the fever subsides in from two to three

days.

The absence of pain during tannic acid treatment is well known to be remarkable, and the same fact applies when it is used for septic burns. Following the first application and drying little pain is experienced. A feeling of tenseness and heat sometimes exists for a few hours during the suppurative phase, before the pus has found its way through the coagulum, but this is soon relieved. The agonizing pain, for which anæsthesia may be necessary, when infected burns are treated by daily dressings is thus avoided, and the general condition of the patient will benefit accordingly.

#### USE OF ANTISEPTICS

When sepsis is established the use of antiseptics in combination with the tannic acid therapy cannot render the area aseptic. Any strong antiseptic is in fact contra-indicated, as it may produce further tissue damage and prevent healing. Weak solutions of dye substances may, however, be used with the object of preventing undue bacterial growth. For these cases the tannic acid was made up in flavine solution and used in conjunction with a weak solution of methylene-blue and brilliant-green. Healing was very rapid, and it is possible that these dyes also help by stimulating epithelial growth.

The danger of softening the coagulum by using a watery solution and setting free toxins, which is very real in some early cases, is not great where sepsis is present at the beginning of treatment. If, however, the electric drier is used after each application of the dye solution softening need not be anticipated.

#### DESCRIPTION OF CASES

Eighteen cases of severe burns from cordite explosions were treated in this series. All these patients were healthy men of ages varying between 18 and 40 years. In nearly all cases the hands and face were burnt. In order of severity the sites involved were: (1) dorsal surfaces of hands and forearm, (2) feet and legs, (3) face. (4) back and neek

(3) face, (4) back and neck.

The degree of the burns is difficult to tabulate, as it varied in different cases and at different sites, but it may be stated that most of the men had a considerable area of second-degree burning. A fact that may be of some significance is that all had been immersed in a mixture of salt water and oil for periods varying from a half to one and a half hours. These cases were received in hospital 120 hours later after preliminary treatment in one of H.M. hospital ships. This treatment consisted of tannic acid and flavine dressings without previous cleansing under anæsthesia, which procedure was no doubt contra-indicated by the condition of the men at that time.

On admission the general condition of the patients was fair, considering what they had been through, and the danger of primary shock and toxemia had passed. Many of them, however, were in a shocked state owing to pain and lack of sleep, and at first frequent injections of morphine had to be given. When the dressings were removed the burnt areas almost without exception were found to be septic, patches of tannic crust and solidified discharge coming off with the gauze and leaving a raw infected surface which was extremely tender. The burnt limbs were now laid on sterile towels and swabbed over with a solution of 5 per cent methylene-blue and 1 per cent brilliant-green. They

were next sprayed with a 20 per cent solution of tannic acid in 1 in 1,000 acriflavine, and the area dried with an electric hair-drier. No dressings of any sort were used. The tannic acid spraying and drying process was repeated three-hourly by day for the next forty-eight hours and the area occasionally dabbed with the dye mixture.

The crust which formed was sticky at first but soon became hard with the constant use of the drier. Great care was necessary at night to keep the burnt surface free from contact with bedclothes and towels, to which it would stick with consequent removal of the crust. The backs of the legs, the front of the wrists, the neck, and the back were troublesome in this respect, and these surfaces usually took longer than the average time to heal. The use of bed cradles and the slinging of limbs with bandages were found very helpful in avoiding this contact. A thick hard crust coloured blue by the dye was successfully formed on most surfaces. In the majority of cases pus collected below the covering and dripped from its edges or from cracks at the flexures. In no case was the crust incised to evacuate pus, but further applications of tannic acid were occasionally employed to harden patches where it had become softened.

Fever was present in all cases, the swinging temperature sometimes reaching a high level at first but always settling in a few days. Most of the severest burns were on the dorsal surface of the hand and fingers. Daily movement of the fingers was found sufficient to prevent them adhering to each other, as the usual practice of separating them with gauze was not adopted.

#### HEALING

From periods of five days onwards the crust begins to peel or break off at the edges. As soon as sufficient crust had come off, active and passive flexion of the finger-joints was started. Special attention should be given to the metacarpo-phalangeal joint, over which the new epithelium is always rather tight.

new epithelium is always rather tight.

The edge of the crust as it receded was treated with the dye mixture till only a small central area was left. The patients seemed sorely tempted to pick off the edges of the crust as healing took place, a procedure which sometimes resulted in reinfection and delay in the date of their discharge. The time of healing in infected cases is considerably reduced by this method of treatment. Evidence of pus and raised temperatures disappeared in an average of three days. In most cases only a small scab of crust remained in the centre of the burn after twenty-one days, and the patients were ready for discharge. When the surface is constantly disturbed by the application of dressings the healing time is greatly prolonged. This point is well demonstrated in one case in which in the early stages of treatment additional dressings of flavine were used on the back of one hand. The crust was disturbed by removal of the gauze, and finally a Thiersch graft was necessitated by excessive granulations and delayed epithelization. Healing of this hand was not complete in five weeks from the beginning of treatment. It seems certain this would not have occurred had the surface been left to heal under the crust, as the other hand, which was just as badly burnt and which was not dressed with gauze, was fully healed, with almost full movements, in twenty-three days.

After the crust is off, the new skin, which is delicate and sometimes rather tender, is treated with sterile petroleum jelly daily. Passive stretching of the skin by flexion of the fingers was persisted with by the patients themselves until full movement was obtained. No form of splinting was used in any of these cases.

#### RESULTS

Of the eighteen patients treated one died of bronchopneumonia. It seems surprising that others did not develop chest complications, in view of the period spent in the sea. With the exception of one case, mentioned above, in which a skin graft was necessary, the remaining sixteen cases were ready for discharge within twenty-one days.

All these men were severely burnt and the burnt areas were septic on admission. Full movements at all joints were present on discharge and there were no contractures. Absence of scarring of face and hands was remarkable, and almost the only evidence of their layers was the approximate of the force real. burns was the appearance of the finger-nails.

#### Conclusions

The treatment by tannic acid and dye therapy of eighteen cases of severe septic burns has been described.

Tannic acid treatment has not failed when sepsis is established. Pus formation is not an indication for removal of the coagulum, and incisions into it are

seldom, if ever, necessary.

The speed of healing is greatly impeded if the coagulum softens and comes off and gauze dressings

have to be used.

Satisfactory final results were obtained. Absence of scarring and contractures was noteworthy. In burns affecting the hands normal movements and function were obtained in sixteen out of eighteen cases.

#### The Prescription of Aspirin

(From the Lancet, Vol. I, 10th February, 1940, p. 278)

It is not uncommon for practitioners to prescribe aspirin in a suspension of mucilage and tincture of orange in preference to the more general tablet form. There has always been some little doubt whether patients should leave the bottle on the shelf indefinitely and expect the same regular as a resultance. and expect the same results as are obtained from

the freshly-dispensed mixture. Tomski and Waller (Pharmaceut. J., Jan. 27, 1940, p. 53) show that these doubts are not without foundation. They find that if acetylsalicylic acid (3 per cent) is dissolved in 50 per cent alcohol and kept under ordinary laboratory conditions it decomposes at the rate of about 1.5 per cent in a day 6.0 to 6.5 per cent in a week and 13.5 to conditions it detemposes at the late of about 1.5 per cent in a day, 6.0 to 6.5 per cent in a week and 13.5 to 14.5 per cent in month, liberating salicylic acid which is a gastric irritant. They also find that a suspension of the same strength kept under the same conditions loses 0.3 per cent in a day, 1.6 to 2.0 per cent in a week and 7.0 to 8.0 per cent in a month. Their conclusion is that suspensions should be prescribed in preference to solutions in alcohol. The following prescription is a useful one:-

R Acid. acetylsalicyl. Pulv. trag. co. . . Syr. limonis . . . .. gr. 40 Aq. chlorof. ad .. 5viii Sig. 3fs S.O.S.

This mixture will keep fairly well, but should be made up freshly if it is to give its maximum effect and be as little irritating as possible. Syrup of lemon is suggested because of the temporary scarcity of orange peel for the manufacture of orange preparations which, by the way, the Minister of Supply has included under 'non-essential medicines'. On the question of solutions of aspirin prepared with ammonium acetate or potassium citrate Tomski and Waller point out that the loss due to decomposition has long been established; thus the Natural Formulary recipe for 'mist. acid. acetylsal' is not to be commended. This mixture will keep fairly well, but should be made

#### Reviews

A TEXTBOOK OF X-RAY DIAGNOSIS.—By British authors. (In three volumes.) Edited by S. C. Shanks, M.D., M.R.C.P., F.F.R., P. Kerley, M.D., M.R.C.P., F.F.R., D.M.R.E., and E. W. Twining, M.R.C.S., M.R.C.P., F.F.R., D.M.R.E. Volume III. 1939. H. K. Lewis and Company, Limited, London. Pp. xlv plus 800, with 710 illustrations. Price, £3 3s.

THE circumstance which has led to the appearance of the third editor's name on the dedication page is a

of the third editor's name on the dedication page is a sad blow to British radiology, for at the time of his death Edward Wing Twining was in the prime of life and one had a right to expect many more years of useful service from him. He however played an important part in the preparation of this volume which was in its final stages at the time of his death.

This third volume, which is by far the largest of the three, is devoted almost entirely to bones, for, though the first two hundred pages are headed 'the central nervous system', the bony supports of the brain and spinal cord loom so large in the pathology of these structures that the generalization is still more or less true. Additional methods of investigating brain tumours and other pathological processes, such as ventriculography and encephalography, alone or comventriculography and encephalography, alone or combined with angeiography have passed out of the stage of being dangerous procedures only conducted by one or being dangerous procedures only conducted by one or two specialists to become the routine examinations in certain conditions: this whole section is very ably written by Hugh Cairns and M. H. Tupe.

The next part is on the accessory nasal sinuses and mastoid processes. This is a branch in which considerable advances have been made in recent recent in the convenience.

able advances have been made in recent years, aided largely by the great precision of the apparatus

Part III is on bones, joints and soft tissues and occupies about two-thirds of the book and there are no less than twelve contributors including the two editors. This part is of course divided into a number of sections; of these the first is a very useful one on

normal structures, which we recommend the practi-tioner to study very carefully so that he is not misled by the inexpert radiologist who has a flair for misinterpretation and who so frequently fails to take a skiagram of the good limb for comparison. The last section, on localizations of foreign bodies, is one that is likely to be referred to very frequently during the next year or so. It is a subject in which considerable advances have been made since the last war advances have been made since the last war.

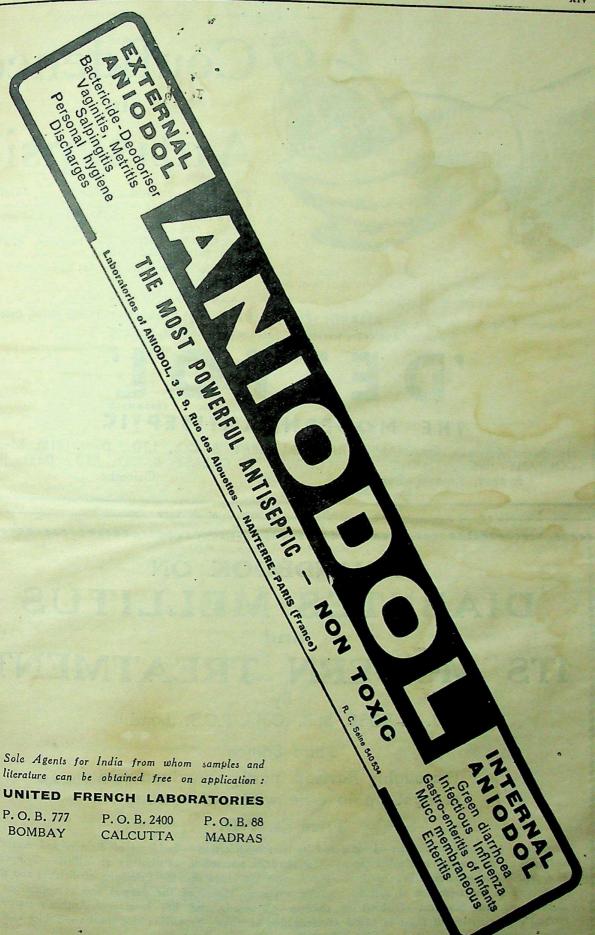
The last three parts are all short ones, on the teeth

and jaws, on the eye, and on cineradiography.

The third volume completes this very important work. The third volume completes this very important work. It is a book that is not written primarily for the radiologist, though one hopes that every radiologist in the country possesses one, but for the physician and the surgeon. We cannot emphasize too strongly the importance of the physician and surgeon reading his own skiagrams and making his own interpretations, in which one hopes he will be guided by the radiologist. Physical examination has its limitations and these are fully recognized: radiography also has its limitations, but there are many radiologists who are loth to recognize this fact. The physician and surgeon can only hope to avoid becoming radiologist-ridden by learning to interpret their own skiagrams, and we know of no work that will help them to do this better than the three volumes of this excellent textbook.

MANUAL HELMINTHOLOGY: A MAN CIANS, SANITARIANS AND MEDICAL HUMAN ZOOLOGISTS.—By Ernest Carroll Faust, A.B., M.A., Ph.D. Second Edition. 1939. Henry Kimpton, London. Pp. 780. Illustrated with 302 engravings. Price. 40s PHYSICIANS,

NINE YEARS have elapsed between the appearance of the first and second editions of this book, and during this interval there have been many advances knowledge of helminthology as applied to human beings, and most of these have been incorporated in the new edition. This applies, among other conditions,





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THACKER SPINK, CALCUTTA

not

An

especially to strongyloides infection and creeping

For the most part the figures are the same but about twenty have been added, fifteen altered or modified, and six or seven omitted. Advantage, in substituting newer and more accurate figures, has not always been taken, however.

In nomenclature we are pleased & note that the list headed 'Names of parasitic helminths of man and pathological designations for infections with these parasites' has been to some extent modified and every infection is not now invariably named after the generic name of the worm with the affix 'iasis' followed by the specific name. But we note that this modificaby the specific name. But we note that this modifica-tion has not been carried as far as we consider it might have been, for instance in the first edition 'Heterophyiasis heterophyes' and 'Heterophyiasis katsuradi' both appeared and they are replaced in the new edition by 'Heterophyes infection' for both of them, this is all to the good, but then we note 'Hymenolepiasis diminuta' and 'Hymenolepiasis nana' still appear in the new edition. Such inconsistencies can be indefinitely multiplied if the two lists are compared closely. We regret that the author, having withdrawn some of the absurd names he concocted for his first edition, did not complete the purge and slaughter them all in the second edition.

There are a few spot maps showing the world distribution of certain important worm infections. Such maps, unless they are accurate, are better omitted, otherwise they will lead astray the inexperienced, with perhaps serious results. A glaring example is that in the distribution of *Echinococcus granulosus*, India is shown as free from this infection. The map was wrong in the first edition and has been reproduced in the

second.

We are glad to see that the names Fulleborniidæ and Fullebornius have been dropped and the old names

Dracunculidæ and Dracunculus re-established.

There is a new chapter on anthelminthics in general with a fairly detailed description of all the important drugs in this class. This, like all summaries, contains many dogmatic statements that are open to objection if the full facts are known, and are therefore likely to be somewhat misleading to the inexperienced. Apart from the days of the days from the danger of some of the remarks misleading the tyro it seems redundant because the description of cach type of infection contains a paragraph on 'Therapeusis' which gives the best specific treatment available.

The book is a very useful reference book particularly for the specialist in helminthology, but as such its value could be greatly enhanced by correction of errors, some of which have been referred to above. But the cost is high and makes it a luxury for the general practitioner who is only called more to treat worm. practitioner who is only called upon to treat worm diseases as a small part of his work even in countries where this type of infection is prevalent. Such a book as 'Clinical Parasitology' by the author of the volume under review in collaboration with Chair is much better under review in collaboration with Craig is much better value for the general practitioner because it contains all the essentials in 'Human Helminthology', with protozoology and entomology of medical interest as well

STEDMAN'S PRACTICAL MEDICAL DICTIONARY. By Thomas L. Stedman, A.M., M.D., and Stanley Thomas Garber, B.S., M.D. Fourteenth Revised Edition. With Etymologic and Orthographic Rules. 1939. Baillière, Tindall and Cox, London. Pp. xii plus 1303, with 23 plates and numerous illustrations. Price, 37s. 6d.

To the shame of British medical publishing houses, the medical profession in the British Empire has to rely on American medical dictionaries. For the average medical reader, and writer, in Great Britain this is not so serious, as he is usually able to distinguish American spellings and, we hope, to avoid them, for the colonial and 'Empire' reader it is much more serious as he is often less features with the English serious, as he is often less familiar with the English language and is much more easily led astray, but for

the editor of an English journal published outside Great Britain the circumstance is a tragedy, as he has to spend half his time changing 'hemoglobin' into 'hemoglobin' and 'sulfate' into 'sulphate', until he finds he has swung the pendulum too far, so that he has to reinstate 'hemiplegia' which his over-enthusiastic staff had changed into 'hæmiplegia'.

In the circumstances, we must he very thankful to

In the circumstances, we must be very thankful to American publishers that we have any medical dictionaries at all in the English, or near-English. language, and we certainly owe a special debt of gratitude to Dr. Stedman, who died on 27th May, 1938. at the age of 84; at the time he was actively engaged in preparing the fourteenth edition of this excellent

dictionary

Dr. Stedman wasn't just content to make a comprehensive dictionary; he had a weakness for etymology and one of his avowed objects was the purification of medical etymology. He certainly achieved a degree of 'purification' and apparently this was sufficient to satisfy him for in the eleventh edition of his dictionary he claimed that his purpose had 'been nearly attained'. One of his greatest triumphs was the nearly attained'. One of his greatest triumphs was the restoration by the final 'e' to the alkaloids and chemical bases, to distinguish these from glucosides, in the Journal of the American Medical Association, and the transformation of the offensive 'k' to the correct in words derived from the Greek, e.g., ancylostoma leucæmia. We cannot help feeling that and leucæmia. We cannot help feeling that Dr. Stedman's life must have been a difficult one or his powers of rationalization particularly well developed to be able to strain at such gnats and yet swallow the whole corps of camels that the American language provides.

He explains that the Greek diphthongs ae and oi become æ and œ in Latin and the same, or simply e, in English. It is a pity that he hadn't a little more to say on this last point; we should like to have heard Nevertheless, how he justified the American practice. Dr. Stedman with the limitations of his American loyalties was a great scholar, has served medical literature well, and will be missed.

The present volume was largely prepared under his direction. It is well up to the standard of its predecessors. A pleasing innovation is the reproduction in English of the Hippocratic oath as a frontispiece.

CHRONIC ARTHRITIS .- By Robert T. Monroe, A.B., M.D. (Reprinted from Oxford Loose-Leaf Medicine). Edited by H. A. Christian, A.M., M.D., LL.D., Sc.D. (Hons.), F.R.C.P. (Hon.). 1939. Oxford University Press, New York and London. Pp. vii plus 84. Price, 8s. 6d. Obtainable from Oxford University Press, Rember and Colorate Oxford University Press, Bombay and Calcutta

This is a small handbook on the subject of chronic arthritis written by the author primarily for the Oxford Loose-Leaf Medicine from which it has been reprinted. It begins with a foreword written by Dr. Henry A. Christian who considers that as the proportion of older people are increasing the incidence of diseases of the joints is also going up. After describing briefly the anatomy and physiology of joints and their various architectural units, the author has put forward a very simple classification based on structure rather than an atticker. He calls the disease of the months of the control of the control of the calls the disease of the months of the calls the disease. rather than on etiology. He calls the diseases of the synovia, which are also known as rheumatoid arthritis, atrophic arthritis owing to the prevalence of atrophy and asthenia in such conditions. Diseases of the joint cartilages, which are known as osteoarthritis, have been classed as hypertrophic arthritis and the diseases of the extra-articular supporting tissues as periarticular fibrositis. In dealing with these three types of arthritis the author has traversed a wide field by discussing the relative ments of the different factors in an unbiassed manner. For instance, while not overlooking the part played by infective foci in the etiology of atrophic arthritis he has not been a blind faddist but has always kept an open mind. His remark that too many teeth have been sacrificed in the name of infective etiology is very wise. While infection plays an important role in the causation of atrophic arthritis the former, according to the author, has no direct bearing on the

hypertrophic type where trauma is the most important etiological factor. The description of the clinical features of the different types of arthritis will be read by everybody with interest and the subject of their management and treatment will be found most comprehensive and of much practical value.

hensive and of much practical value.

In this connection, the writer has very pertinently commented on the use of some of the drugs and this commented on the use of some of the drugs and this should be a check to their irrational and indiscriminate use. He goes on to say 'it is fruitless to review the amazingly long list of antirheumatic remedies. Some show ingenuity, as bee venom, histamine and cholin iontophoresis and chaulmoogra oil; others are thoughtlessly conceived as pills of concentrated spinach; many are improper combinations of sedatives, salicylates, laxatives and potentially harmful drugs. They flourish on the gambling spirit of people, who are glad to try on the gambling spirit of people, who are glad to try their luck on escaping the difficult programme that nature eventually enforces'.

The whole subject has been presented in such a simple and practical manner that this book will be found extravely useful to every practitioner, each and

found extremely useful to every practitioner, each and every one of whom has frequently to deal with patients afflicted with this very chronic and painful malady.

THE SYNOVIAL MEMBRANE AND THE SYNOVIAL SPECIAL REFERENCE WITH ARTHRITIS AND INJURIES OF THE JOINTS .- By David H. Kling, M.D. Balllière, Tindall and Cox, London. Pp. 283, with 80 illustrations and 34 tables. Price, 25s.

This monograph is based upon the findings of a large amount of original research conducted by the

large amount of original research conducted by the author over a period of fifteen years. His work proves that the old theories regarding the structure and function of the synovial membrane, and the origin and function of the synovial fluid, are inadequate. A proper study of the synovial membrane reveals that it is not a simple structure throughout; it contains secretory elements in certain areas. These areas produce the normal synovial fluid, which consists chiefly of mucin, by active secretion. This would seem to dispose of the theories which seek to account for the presence of mucin by calling it the interstitial tissue of the synovial cells, produced by their degeneration. In pathological conditions, effusions consist of the mucin produced by the activity of the secreting cells

mucin produced by the activity of the secreting cells and also of a transudate or exudate derived, via the synovial membrane, from the circulation. There is thus ascribed to the synovial membrane a dual structure

thus ascribed to the synovial membrane a dual structure and function, and to the fluid a dual origin.

Much of the book is taken up by descriptions of experimental technique and results, and tables of data and other findings. The concluding chapters indicate the clinical applications of all this work, and the reader will find suggestions for routine biochemical and microscopical investigation of joint effusions.

A thoughtful and painstaking book, it is recommended to those interested in the problems of joint conditions, both medical and surgical.

conditions, both medical and surgical

W. McN. N.

MYTHOLOGY OF THE SOUL: A RESEARCH INTO THE UNCONSCIOUS FROM SCHIZOPHRENIC DREAMS AND DRAWINGS.—By H. G. Baynes, M.B., B.C. (Cantab.). Ballilère, Tindall and Cox, London. Pp. xii plus 939. Illustrated. Price,

In his preface the author maintains, and perhaps rightly, that the type of mental disorder now labelled 'Schizophrenia' lies at the very roots of the psyche. Hence, to investigate it, only an introverting psychological method is suitable. The author regards Jung's analytical method as set forth in his 'Psychology of Dementia Præcox' to be the only effective introverting technique in western Europe. To all who have been appalled by the seemingly insoluble riddle of the schizophrenic's mind, the author's view that psychology as a science is deeply bound up with the history of

civilization, of philosophy and of religion and, above all, with princitive mentality, will make a strong appeal. This is also Jung's view. The basic feature of this remarkable book is the study of two patients of the author, one of whom was himself a doctor. The other author, one of whom was nimself a doctor. The other patient was by profession a draughtsman. Both patients were psychoanalyses but in addition to this, both were encouraged to that whatever came into their minds. With the exception of the reproduction of three paint-With the exception of the reproduction of three paintings by Paul Klee, a reproduction of the Lamaist Vajra-Mandala, and the Muladhara Chakra from Avalon's Serpent Power, the 53 illustrations are all pictures drawn by the author's two patients. The author is by no means the first individual to trace out the inner experiences of schizophrenics and the same order of experiences in primitive races. Long before the advent of psychoanalysis psychologists were aware of the unexpected light which a study of aware of the unexpected light which a study of early psychic stages in evolutional development threw upon the study of dreams and functional disturbances of thought. The present work goes a long way to confirm the hypothesis that the abnormal process is a primitive process. An ardent disciple of Jung the author would appear to think that the transformation of the libide as conceived by Jung is sufficient to of the libido as conceived by Jung is sufficient explain all archaic beliefs, myths, fairy tales and the like. In everyone of the magic archaic experiences are present as the undercurrent of the waking thoughts of the day, but only in specifically schizophrenic types does this undercurrent come to active conflict with the ordinary thoughts of the understanding. In schizophrenia it is more especially the initial states which really bring these archaic magic experiences to flower. The biological revolution of puberty often forces the disease to its first manifestation. In this period of life experiences take place which may plunge the human being into a shoreless maelstrom of uncertainty. Whether to follow his enthusiastic impulses and give himself freely to the world or to withdraw gloomily into the self. This and much more the author describes with meticulous precision. Every student of psychology in any of its branches cannot fail to profit by a study of the fascinating material presented to his inspection.

O. B-H.

THE ANATOMY OF THE HUMAN SKELETON.—By
J. Ernest Frazer, D.Sc. (Lond.), F.R.C.S. (Eng.).
Fourth Edition. 1940. J. and A. Churchill,
Limited, London. Pp. viii plus 300, with Limited, London. Pp. viii plus 300, v 219 illustrations, many in colour. Price, 30s.

THE reason given by the author for the production of the fourth edition of this book is that the modifications in terminal transfer in the modifications in terminal transfer in the modifications in terminal transfer in the modification of the mod tions in terminology had not been finally decided upon when the third edition was published. In addition, however, certain changes and corrections have been incorporated.

incorporated.

This is not a simple description of the bones such as one is accustomed to find in the typical textbook of anatomy, for although the bones naturally form the basic structure of the basic s basic structure of the book, as they do of the human body, their description is amplified by a full discussion of all the structures with a high line of the structures with a high relation of all the structures with which they come into relation as well as the sites of attachment of muscles, ligaments, etc. The descriptions are clarified by numerous blackand-white drawings and the structures with which the etc. The descriptions are clarified by numerous black-and-white drawings and coloured plates in which the various areas on the bones are marked in special colours indicating the attachment of special structures, for example, brown for muscles, blue for synovial membranes, yellow for ligaments and so on. Once this colour scheme has been understood the reader can see at a glance what functions different parts of a bone perform.

It is a book that would be useful for a student, to give him a wider insight into the true function of the skeleton than he is likely to acquire from the ordinary textbook, but we doubt if there are many students who can afford another thirty shillings (twenty rupees) on a book that can never replace but only act as an adjuvant to the standard anatomy he must possess.

must possess.



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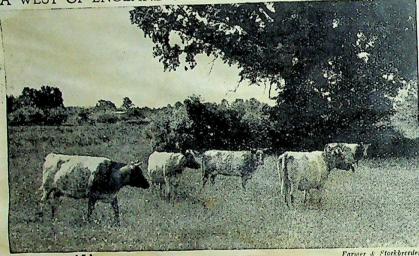
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THE CARE OF YOUNG BABIES .- By Joh Gibbens, M.B. (Cambridge), M.R.C.P. (Logg.). 1940. J. and A. Churchill, Limited, London. Pp. ix plus 169, with 8 plates and 5 text-figures. Price, 3s. 6d.

Many books on the subject of the realing of infants have been produced in recent years; some

indifferent:

This little book is not only in the inner category, but is in the highest class, and the author is to be congratulated on the extremely good advice he has laid down for mothers in language which is easily understandable to the lay mind, for the book is in no sense of the word, a medical one per se.

Dr. Gibbens makes reference to many of the 'old wives tales' which were in vogue during the latter part of the last century and the beginning of this one, and disposes of their, in many cases, misleading dicta with

logical arguments.

He makes reference to the fond grandmamma who so often upsets the careful routine laid down for the

He cites instances where good advice has been flouted, with such firmness, that one may be excused for believing that he would like to have added to the Litany, 'From the stupidity of some mothers, Good

Lord deliver us'.

This is a truly excellent booklet which every mother

can read with advantage.

ILLUSTRATIONS OF BANDAGING AND FIRST-AID. —Compiled by Lois Oakes, S.R.N., D.N. (Leeds and Lond.). 1940. E. and S. Livingstone, Edinburgh. Pp. vii plus 248. Illustrated with 290 photographs. Price, 6s. Postage, 6d.

'IT is the aim of this book to enable the student, by means of pictures, to quickly master (Oh, Lois!) the science and art of bandaging and first-aid in fractures and hemorrhages'. 'For the sake of clarity the operator is not always shown in the position that he would normally occupy in relation to the patient, and, for the same reason not always holding the and, for the same reason, not always holding the bandage exactly as it would be held in the natural circumstances'. We've got you, and the idea is a very sound one, but 'for the sake of clarity' it might have been expressed rather differently.

These two sentences will, we hope, give the reader a line on the scope of the book and on the weakness of the writer's literary style, but we do not honestly think that the latter matters. The photographs are excellent, and, even if a large percentage of the explanatory sentences contain unattached participles, the meanings of such sentences as 'note that the ears are covered up, in applying this bandage' are really quite

There are four sections, triangular bandaging, roller bandaging, first-aid in hæmorrhage, and first-aid in

It is a book that will be useful to the doctor, the student, the nurse and the 'first-aider', and all those that have to teach them.

TEXTBOOK OF PUBLIC HEALTH.—By W. M. Frazer, O.B.E., M.D., Ch.B., M.Sc., D.P.H., and C. O. Stallybrass, M.D. (State Medicine), Ch.B., D.P.H., M.R.C.S., L.R.C.P., Order of St. Sava. Tenth Edition. 1940. E. and S. Livingstone, Edinburgh. Pp. x plus 504. Illustrated. Price, 21s. Postage, 7d.

This tenth edition is practically a new text. It accomplishes fully its stated objective of covering the accomplishes fully its stated objective of covering the information required by examining bodies for the English D.P.H. A mine of information has been compressed within the 500 pages. The text possesses the great advantage of having been compiled by authors who are both teachers of a university and at the same time are practitioners of public health administration. time are practitioners of a university and at the same time are practitioners of public health administration. It is of interest to note that this textbook began its career in 1874 as 'Medical Police' with subsequent evolution of its title through 'Forensic Medicine and Public Health' to 'Public Health' alone, reflecting the trend of practice. The full accounts provided of the

recently consolidated Public Health (1936), Housing (1936) and Food and Drugs (1938) Acts found particularly useful. The chapters on Genetics and Mental Hygiene are somewhat superficial and lack practical indication of their specific utilizability in administration. Also the advice as to site and construction of hospitals, particularly isolation, is not in line with present epidemiological knowledge but conforms to legal requirements that lag very badly in this respect. One trusts that the concluding chapter on Medical Aspects of Civil Air Defence may be required no longer 70 years hence in a textbook of Public Health. Technical description of types of bombs and their action indicates the queer twist given to the trend of public health by world conditions.

The tenth edition can be heartily recommended to anyone desirous of reference to English public health practice. Its value in India lies in furnishing basic information, particularly with respect to the impersonal public health services. In its personal public health, the absence of consideration of particular problems of rural public health would be considered the chief drawback under local conditions.

ASEPTIC MENINGITIS: (ACUTE ASEPTIC MENINGITIS).—By Rustom Jai Vakil, M.D. (Lond.), M.R.C.P. (Lond.), D.T.M.&H. (Lond.), F.R.F.P.S.G. 1939. Printed by V. V. Bambardekar at the India Printing Works, Fort Bombay. Sole Agents:—The Popular Boo Grant Road, Bombay 7. Pp. viii plus 94 -The Popular Book Depot,

THIS small handbook contains a summary of the work done and clinical features and diagnosis of that little-understood condition acute aseptic meningitis which is also known as benign lymphocytic meningitis. The general medical profession, particularly in India, is not at all familiar with this condition and it is generally labelled as meningism, poliomyelitis, tuber-culous meningitis or encephalopathy due to various diseases. A comprehensive description of the disease will therefore be welcome to the profession. The author states that benign lymphocytic meningitis is a definite disease of the central nervous system involving the meninges and is caused by a filter-passing virus which has been identified and isolated. In the blood infected person and experimentally-inoculated animals, antibodies develop and the demonstration of the latter by protection experiments constitutes an important test for diagnosis of the condition. The writer lays emphasis on the confusion which this condi-tion often causes in the diagnosis, particularly of tuberculous meningitis and he has therefore devoted a special chapter to this subject. He says that while tuberculous meningitis is uniformly fatal, benign lymphocytic meningitis has always a favourable prognosis. At the end of the book, there are records of five English cases and two Indian cases. A very charting title cases with the company of the prognosis. exhaustive bibliography is also appended and this will be of great help to anybody who may be interested in the disease.

The two Indian cases reported by the author are not very convincing and certainly one of them has been diagnosed purely on clinical grounds even without the help of the lumbar puncture. In this respect Dr. Vakil cannot be considered to have escaped the errors of a general practitioner although, of course, he has suggested benign lymphocytic meningitis.

The book is an excellent critical review of benign lymphocytic meningitis and should be read by every practitioner in India.

M. N. D.

HYGIENE FOR NURSES.—By John Guy, M.D., D.P.H. (Camb.), F.R.F.P. & S. (Glas.), F.R.C.P. (Edin.), and G. J. I. Linklater, O.B.E., M.D., D.P.H., D.T.M. & H., M.R.C.P. (Edin.). Fifth Edition. 1940. E. and S. Livingstone, Edinburgh. Pp. xiii plus 239. Illustrated. Price, Es. Postage, 5d.

This subject is too often rendered dull and tedious to nurses by much superfluous subject-matter. The authors have avoided this pitfall, and the book makes interesting reading, besides supplying all the knowledge that the nurse in training requires for practical purposes and examination, in hygiene and dietetics.

HEALTH BULLETIN, NO. 14. MALARIA BUREAU, NO. 6. 'HOW TO DO A MALARIA SURVEY.'— By Colonel Sir S. R. Christophers, F.R.S., I.M.S. (Retd.), Lieut.-Colonel J. A. Sinton, M.D., D.Sc., I.M.S. (Retd.), and Lieut.-Colonel G. Covell, M.D., Fourth Edition revised by Lieut.-Colonel Q. Covell, I.M.S., Director, Malaria Institute of India. 1939. Published by Manager of Publications, Delhi. Pp. vi plus 208. Illustrated. D.P.H., I.M.S. Price, Re. 1-12 or 2s. 6d.

This was one of the earliest publications of the Malaria Survey of India. It has proved invaluable to malariologists in India and abroad. The present, the fourth edition, has been revised by Colonel Covell.

It is well illustrated by line drawings throughout and there are invaluable tips to help the malarial surveyor not only to carry out the various procedures but to do them rapidly and accurately.

It is a low-priced publication and every malariologist

in India should possess a copy.

HEALTH BULLETIN NO. 5. MALARIA BUREAU NO. 1. 'LECTURES ON MALARIA.'—By Lieut.-Colonel G. Covell, M.D., D.P.H., I.M.S. 1940. Published by the Manager of Publications, Delhi. Pp. 33. Price, As. 5 or 6d.

THERE appears to be a real need for a bulletin containing rather more detailed information regarding malaria, to meet the requirements of officials and others who are not necessarily medical men, but whose duties constantly bring them into contact with the manifesta-tions of the disease, such as engineers, forest officers, members of the disease, such as engineers, forest officers, members of the Indian Civil Service, officers of the defence services, railway officers, managers of tea. coffee and rubber estates and of other industrial concerns. Although such individuals may already possess some knowledge of the basic facts concerning malaria, this is often incomplete, and they are usually most anxious to learn more about the subject.

The lectures included in this bulletin are designed

to afford the type of information likely to be most generally useful in the above-mentioned circumstances, and to supply answers to the questions which experi-

and to supply answers to the questions which experience has shown are most frequently asked.'

Though not primarily written for the medical man, there are few doctors who will not learn a great deal from these lectures. They are both encouraging and inspiring. We recommend them very strongly to the general medical reader as well as to the malariologist.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. 235. 'THE CHEMICAL COMPOSITION OF FOODS.'—By R. A. McCance and E. M. Widdowson. 1940. Published by His Majesty's Stationery Office, London. Pp. 150. Price, 4s.

'THE nutritional and dietetic treatment of disease. as well as research into problems of human nutrition, demand an exact knowledge of the chemical composition of food. The pioneering investigations into food chemistry were made in Germany and the United States of America, and until after the war of 1914-18 this country lagged far behind. The researches on vitamins which bears to make resid progress, soon effect the war, and in which this country played a leading part, stimulated a demand for a wider knowledge about human foods. Accordingly, when Dr. McCance approached the Council for support in order that he wish determine in the first instance. might determine, in the first instance, the amount of carbohydrate in foods used in the treatment of diabetes, it was recognized that the project was likely to have practical importance, and a grant was made for work along these lines at King's College Hospital, London. For twelve years the Council have continued to support similar and related studies by Dr. McCance and his colleagues first at King's College Hospital and latterly

at the Department of Medicine, University of Cambridge, and during that time the investigators have gradually extended the scope of their inquiries. have gradually share has been evolved by which they A system of analysis has been evolved by which they have determined all the important organic and mineral constituents; of foods, with the exception of the vitamins, which have formed the subjects of extensive research by they workers and by different methods. Some idea of the amount of detailed analytical work involved in these chemical studies may be gathered from the statement that as many as twenty different constituents may require to be determined in a single foodstuff? foodstuff'.

This systematized analytical procedure has now been applied by Dr. McCance and his colleagues to almost all the foods commonly eaten in Great Britain. The method of approach has been somewhat different from that of previous workers in the same field; for the foods have been analysed, not only in the raw state, but also as prepared for the table, and studies have been made of the losses introduced by cooking. The investigators have also examined the question whether all the constituents of a food are really available for the body's use; whether they are decomposed in the alimentary canal, or fail to be absorbed. Some of the analytical data have already appeared in earlier reports in this series, and the present volume includes previously published figures—which have been carefully checked and corrected where necessary—as well as many others which are new. It should thus contain all the quantitative data likely to be required for practical work involving detailed knowledge of the chemical composition of British foods. It cannot, however, be regarded as completely superseding the three previous reports, for the latter contained much information which has not been reprinted.'

An unusual feature in this report is the inclusion of about one hundred recipes of common English dishes, including both the ingredients and a short description of how they are prepared. This will serve the double purpose of helping the physician to calculate the value of a diet of which these mixed dishes form a part, or conversely of helping the nurse or patient to work

or conversely of helping the nurse or patient to work out an appetizing diet along the lines prescribed by the physician. These recipes are cleverly selected from standard cookery books by Miss C. M. Verdon-Roe. It is a book which will be of very great value to the Indian worker, particularly if he uses it in conjunction with his Health Bulletin No. 23 which supplies the analyses of foods that are neculiarly Indian in origin. analyses of foods that are peculiarly Indian in origin.

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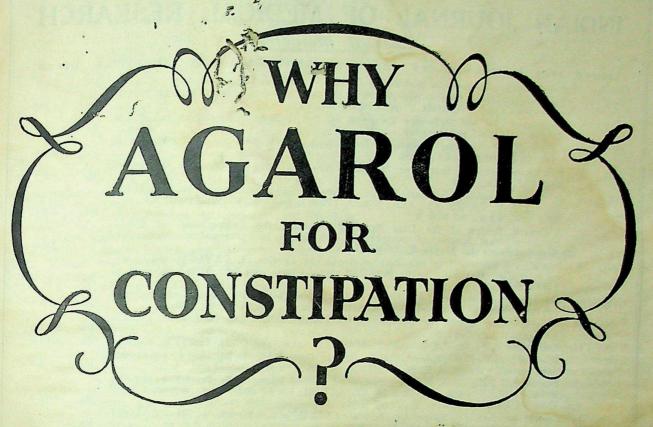
#### Abstracts from Reports

ANNUAL REPORT OF THE MYSORE STATE DEPARTMENT OF PUBLIC HEALTH FOR 1938

EXCEPT for a rise in the incidence of plague, public health was generally satisfactory. Five thousand, one hundred and ninety-six deaths from plague were reported during the year against 4,812 in the previous year. In connection with the central of plague, in year. In connection with the control of plague, in addition to the anti-plague inoculation and disinfection of houses over the control of plague for of houses, cyano-gas fumigation was recommended for adoption in various places. Six thousand, two hundred and eighty-four houses were cyano-gassed, 2,874 in the Kolar Gold Field Sanitary Board area, 100 in the Bangalore City and 3,310 in other places. Eight hundred and eighty deaths from cholors occurred during the and eighty deaths from cholera occurred during the year against 4,239 in the previous year. During the year, 789 deaths from smallpox were reported against 1,095 in the previous year. The number of vaccinations was 250,780.

The revised system of registration and compilation of the statistics of births, deaths and marriages introduced in Bangalore and Mysore cities and on the Kolar gold fields and the districts of Bangalore and Shimoga have given good results.

Shimoga have given good results.



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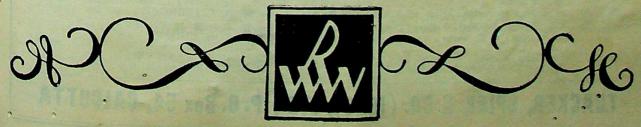
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The total number of births during the year is 150,410 (146,737), the computed birth rate bing 22.0 per mille of population as compared with 21.6 in the preceding year. The total number of deaths was 102,228 (102,118) giving a death rate of 9 per 1,000 of population as against 15.1 in the property of age was 16,082 (15,567) giving in it fant mortal of age was 16,082 (15,567) giving in it fant mortal rate of 106.9 against 106.1 in the province year.

Experimental work was continued in order to

Experimental work was continued in order to determine the standards of purity of most of the common articles of food with reference to their nutritional value. As a result thereof, action was taken to discourage the use of polished rice and to encourage the use of hand-pounded rice. Experiments on other

articles of food are being conducted.

During the year, 190 cinema shows were arranged in different places in the districts. Two health exhibitions were held, one at the Annual Dasara Exhibition at Mysore, where a large section on nutrition and its importance was newly added and the other at Hassan in connection with the State Women's Conference.

The health centre at Closepet continued to do good Village improvement work was started by the health league in 18 new villages. Improvements were effected to several houses by providing latrines, soak pits, manure pits, and windows and by plastering and

white-washing them.

Malaria control.—Control of malaria is a very important public health problem in the State as malaria accounts for over 30 per cent of the total mortality. Control work was continued in the cities of Bangalore and Mysore and in Hiriyur, Mudgere, Nagenahalli, Mandya and ten selected villages in the Irwin Canal area. It was started in Chikmagalur and Sakrepatna also. Malaria survey was completed in Shimshapura, Belur, Jog and Devarayasamudram and in ten villages in the Marconahalli area, 17 villages in the Closepet area and two villages close to Bangalore as well as in the Alageshwar tea estates, the area around the Princess Krishnajammanni Sanatorium, Mysore and Balehalli village near Chikmagalur. The annual spleen and parasite survey of the Bangalore and Mysore was done, as usual. The spleen rate for Bangalore was found to be 0.13 as against 0.31 in the previous year and the parasite rate 0.91 against 0.5. The spleen and parasite rates for Mysore city were 1.3 and 2.2 per cent against 2.6 and 7.2 in the previous year. Both malariol and Paris green were used as larvicides. The effects of malaria engineering measures were observed during the malaria engineering measures were observed during the year in the three villages.

The guinea-worm staff visited 960 villages during the year, 524 step wells were examined and 66 wells were newly stocked with fish. The larvicidal fish was renewed in 111 wells, and 19 wells were treated with

The staff on hook-worm control carried on the work propaganda and the construction of bore-hole of propaganda and the construction of bore-hole latrines, in the villages where infection was found to be heavy. They visited 1,539 houses in 38 villages. One hundred and thirty bore-hole latrines were constructed during the year.

In addition to the work on water-supply scheme at Mysore, Bethamangala, Kolar, Hiriyur, Harihar, Shimoga, Sagar, Saklespur, Shikarpur and Hassan, 14 towns and villages were provided with protected water-supply.

water-supply.

Plans for the improved lay out of five places and type designs of slaughter-houses, mutton stalls and rat-proof dwelling houses were prepared during the year.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1938. BY LIEUT.-COLONEL A. M. V. HESTERLOW, Ch.B. (EDIN.), B.Sc., P.H. (EDIN.), D.T.M. & H. (EDIN.), I.M.S., DIRECTOR

The death rate for the year 1938 was higher than the decennial average by 2.77. A noticeable increase was recorded in the number of deaths from cholera (6,465).

The increase in the number of deaths from cholera was the principal factor in raising the death rate

Diseases	1938	1928-37
Cholera Smallpox	1.50 0.21	0.70 0.21
Plague Fevers Dysentery and diarrhoea	13.33	12.27
Respiratory diseases	1.50 0.87 0.25	1.23 0.76
All other causes	4.75	0.25 4.22
TOTAL	22.44	19.65

Nine hundred and seventy-two thousand, six hundred and ninety-six persons were inoculated with cholera vaccine excluding those inoculated in tea estates. Four hundred and ninety-five thousand, eight hundred and seventy-two doses of bacteriophage were issued during the year under report. As in past year, seven mobile epidemic units, each consisting of three sub-assistant surgeons and six disinfectant carriers, were employed; this staff was found inadequate. When there is a severe epidemic which breaks out in several districts simultaneously, affecting extensive areas where communication is not good, it becomes impossible for the staff to cover the whole area. It was for this reason and to make the unit more useful that it is now customary to designate as the epidemic unit—a unit consisting of one sub-assistant surgeon and two disinfectant carriers and to post these in suitable centres in the district from which infected areas would be more readily accessible, instead of locating them all at district headquarters. In such circumstances, the only alternative is to close the Public Health dispensaries and to utilize the staff for epidemic duty, dislocating the system of kala-azar treatment work, which is very undesirable. Additional units are therefore imperative.

One hundred and fifty deaths from cholera were reported from tea estates during the year compared with 220 deaths in 1937. The corresponding ratio per

mille being 0.12 and 0.22 respectively.

A total of 618 villages was infected with smallpox. Mortality from smallpox was reported from 67 out of 148 registration circles. The highest number of deaths (280) was recorded in May and the lowest (46) in September.

No case of plague was reported.

Fevers were responsible for 59.46 per cent of the total provincial mortality as compared with 62.13 per cent in the previous year. These figures include deaths from malaria, kala-azar and also from various other diseases, which have fever as their predominant symptom.

Two hundred and thirty-five deaths from conspinal fever were reported from three districts.

Three thousand, two hundred and thirty-four cases of yaws were treated against 2,607 in 1937. In each of the districts of Goalpara and Nowgong, three more centres undertook the treatment of yaws. Two sub-assistant surgeons received training in the diagnosis and treatment of yaws in each of the districts of Kamrup and Nowgong. The treatment with neosalvarsan has proved very successful.

Twenty-five cases of naga-sore were treated in the Kazarup district during the year under report against

The number of deaths from kala-azar was greater in 1938 by 281 than that of the preceding year. The number of patients treated was larger by 5,217. The increase in deaths is shared by the districts of Sylhet, Kamrup and Sibsagar and the increase of cases treated is shared by all districts. The method of diagnosis and treatment of kala-azar was the same as in previous years. Neo-stibosan is again being used in urban areas only at the discretion of the medical officers. The price of this drug has now been reduced.

In Cachar district 422 villages were surveyed and 331 suspected cases were discovered of which 104 were found to be positive. All these cases were brought under treatment.

Two kala-azar treatment centres, one at Ratanpurand the other at Matijuri in the Hailakandi subdivision, were opened during the year under review.

Four thousand, three hundred and seventy-five lepers received treatment in the leper asylums and other centres of treatment under the Medical and Public Health Departments during the year under review. Of these 910 lepers were treated in the leper asylums, wards and colonies.

#### SEVENTY-SEVENTH ANNUAL REPORT OF THE GOVERNMENT CINCHONA PLANTATIONS AND FACTORY IN BENGAL FOR THE YEAR 1938-39

Towards the middle of the year under review the convention price of quinine sulphate rose by 1d. per ounce due chiefly to a continued fall in the value of sterling. Government prices, however, remained steady throughout the year. An examination of recent import figures reveals an interesting feature, namely, that the Indian quinine trade has been gradually passing from the Dutch and the British into the hands of the Germans. This is undoubtedly due to the system of subsidized exports that has prevailed in Germany. The bark, of course, still comes mainly from Dutch sources in Java.

Mr. Wilson's enquiry into the prospects of cinchona cultivation in India, referred to in our last report, was completed during the year. His report gives a brief account of the recent trend of development of cinchona cultivation in India, both through Government and private enterprise, and shows that, taking India as a whole, there has been little progress towards reducing the margin between the country's total consumption of quinine and its production. On the findings of the report the scope for future development in cinchona lies mainly in the south of India. This may be explained by the fact that the whole table-land of the Deccan offers suitable ranges of elevation, while in the north, the elevations are to be found only along a narrow belt at the foothills of the Himalayas and its offshoots.

The report brings out in striking manner the paucity of quantitative data on cinchona cultivation in India. Neither the yield tables nor the cost figures given by Mr. Wilson can be taken as authentic. They have not been derived from statistical averages, but are based on general experience. They give, nevertheless, useful indications which should be of help towards formulating schemes of extension in new areas, where no experimental work has yet been done. The need for well organized quantitative data is being increasingly felt in the Bengal Cinchona Department in connection with the planning of production and distribution. The present system of plantation mensuration which was devised nearly thirty years ago has completely broken down under the altered methods of cultivation and harvesting.

The soil studies in connection with the Wilson enquiry give interesting generalizations in the field of which little is yet known to us. The results must, however, be accepted only on a tentative basis and before a proper correlation can be established between soil factors and the growth of cinchona, more comprehensive schemes of sampling must be devised to eliminate the climatic and inheritance factors. Further soil studies on an extensive scale are desirable not only to find the characteristics best suited to cinchona, but also with

a view to devising methods of maintaining these characterists over a series of planting cycles. This is one of the really pressing problems of cinchona cultivation in India, because of the rigorous climatic and topographic and ditions in which cinchona has generally to be grown as country.

Mr. Wilson stands on andisputed ground when he Messes the need for research. This need has been previously medicined in our own reports. There is on the one hand botin for improvement in our present methods of election, propagation, cultivation and harvesting. On the other hand it is necessary to place even the existing methods on a scientific basis, so that they may depend for successful exploitation not so much on that empirical experience, which is known as the personal touch, as on the observance of principles established by experiment which take into account the varying conditions of locality and time. The successful cultivation of cinchona is no doubt an art, but it is an art that, to obtain perfection, must take the fullest advantage of existing knowledge.

#### REPORT OF THE MEDICAL RESEARCH COUNCIL, LONDON, FOR THE YEAR 1938-39

#### MEDICAL RESEARCH AND THE WAR

During the past year the work of the Medical Research Council has gone steadily forward and, except in the case of their administrative staff, the continuous state of war expectancy affected it but little until the late summer. The policy of the council has been to encourage their research staff and grantees to continue their investigations as under normal conditions. On the outbreak of war this policy has been maintained, although some research workers have had to respond to special calls—to join the defence services, to take part in emergency schemes, or to undertake special investigations suggested by war conditions.

It cannot be denied that the disturbed political atmosphere of the past year has brought increased difficulties to those whose work depends so greatly upon concentration of thought and action, and upon freedom from worry. At the same time, perusal of this Annual Report, and especially the account of the work done at the National Institute for Medical Research and at other special centres throughout the country, will show that a harvest of discovery has been procured in spite of the unrestful situation.

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The council foresaw that the work at the National Institute would be at least as important in time of war as in time of peace, and took action to provide protection for the staff at Hampstead. Since the outbreak of hostilities, therefore, the staff of the National Institute have been able to proceed with their work. It cannot be expected, however, that medical research either there or elsewhere can remain unaffected by war. Apart from changes and possibly some reduction in personnel, the natural desire of many investigators is to leave their peace-time problems and direct their attention to subjects of immediate war interest. The presentation of new war problems requiring investigation is therefore usually received with enthusiasm by the research worker. The danger, in fact, is not that of failure to investigate such problems but rather that, by switching over to other objectives of immediate practical interest, the fruits of promising research unrelated to war should be lost. It is the intention of the council, so far as they are able, to prevent such losses to important knowledge.

At the same time, it is recognized that war conditions in themselves offer special opportunities for the acquisition of knowledge which is by no means of emergency interest only. It will be remembered, for instance, that the Medical Research Council (then Committee) came into being immediately before last war, and during their early years directed most of their attention and energy to the solution of problems presented and made urgent by the emergency. In the words of the Annual Report for 1917–18, 'the needs of war have given stimulus to enquiries upon many



### A Call for Help

Veganin Tablets present acetylsalicylic acid, phenacetin and codeine in synergistic combination, whereby the individual action of each constituent is greatly enhanced.

Veganin Tablets are not advertised to the public.

Supplied in tubes of 10 and 20.

A trial supply to Physicians on request.

MARTIN & HARRIS Ltd., Mercantile Buildings, Lall Bazar,

CALCUTTA.

Also at Bombay, Madras, Karachi
and Rangoon.

# THE CALL OF PAIN

The call of pain is seldom stilled, and relief is of primary importance to the suffering patient. The paroxysmal pain of dysmenorrhoea, the persistent and intense throbbing of migraine, the shooting pains of neuralgia, the pain in affections of the bones and joints, the pain resulting from accidents—all these, and many other conditions, yield with impressive readiness to the sedative and analgesic efficacy of Veganin. With Veganin there is no systemic disturbance, no habituation. It may therefore be safely entrusted to the patient as a dependable means of relieving and preventing pain.

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From six months of age onwards, the mineral constituents of the infant's dietary assume increasing importance.

Allenburys Malted Food No. 3 is specially adapted for use after six months of age. It contains the necessary amounts of iron, calcium, phosphorus, and of vitamin D.

Allenburys Malted Food has a basis of specially cooked and dextrinised wheaten flour; this is changed by the malt diastase present into a complex of dextrins and sugars which form the infant's introduction to starchy foods.

Descriptive literature will be sent on request.

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sides, and out of the circumstances of the time sine sides, and out of the circumstances of the time some unusual opportunities and facilities have come to scientific workers'. The history of cork done during the years 1914-18 is a remarkable one, and a perusal of the records of the Medical Research committee of those years cannot but excite admine it noth for the success with which the opportunities official were seized by workers in this field and for the inspiring energy with which the Secretary, Sir Walter Fletcher, carried out the general policy. It was the first time in the history of this country that organized scientific endeavour in medical research ever had a chance of history of this country that organized scientific endeavour in medical research ever had a chance of justifying itself, and right well did it respond.

It will be asked what contribution medical investiga-

tion can make in the present war. It is at least certain that the more recent developments of blood transfusion, together with a well-organized service for allowing this to be carried out on a large scale, will lead to results far better than those obtained by the transfusion of gum acacia solution introduced in the later part of the war of 1914-18 through the work of

the Committee on Shock.

In the case of wound infection, probably the largest single cause of death among wounded men reaching hospital in the last war, it can be safely predicted that modern discovery in the chemotherapeutic treatment of bacterial infection will be one of the outstanding beneficial factors. Where the infection is due to hæmolytic streptococci, it may be hoped that the established curative effect of the sulphanilamide group of compounds will be as successful in wounded men as it has proved in puerperal sepsis and septicæmia. The evidence of the curative effect of these compounds in gas-gangrene infection is not so certain, but what evidence there is suggests that in this case also they will be life saving. It will be necessary as soon as possible to get evidence on this point, and especially to evaluate the relative curative effects of the sulphanilcompounds and gas-gangrene antitoxin. Although the use of gas-gangrene antitoxin still receives wide support, its beneficial effects have never been established with certainty. Needless to say, however useful the new chemotherapeutic compounds will prove, it is not likely that the need for proper surgery in the

treatment of wounds will diminish.

Another matter which presses for early solution is the possible prophylactic effects of the sulphanilamide derivatives, apart from their curative action. Arrangements have already been made by the Army Medical Service to determine whether the administration of these compounds immediately following injury will prevent subsequent infection by the more common pathogonic micro-organisms

pathogenic micro-organisms.

WAR EMERGENCY SERVICES During the two years preceding the war the Medical Research Council were entrusted with a number of responsibilities, on behalf of H. M. Government, for the preparation of various emergency medical services.

### Medical supplies

One of the first things of the kind which the council were asked to undertake was the organization and supply of certain antitoxins to be held in readiness for war purposes.

Specialist personnel

The ordinary work of the council places them in a The ordinary work of the council places them in a unique position as regards contact with those who have special knowledge of different branches of medical science and allied subjects. They have thus, both before and since the outbreak of war, been able to assist in finding men possessing the highly specialized qualifications required for various items of emergency work which have arisen work which have arisen.

Blood transfusion depôts

The council also undertook the organization of four depôts for the collection, storage and supply of blood for transfusion purposes. These are situated in the home counties and are intended—in addition to serving their ewn immediate neighbourhoods—to augment the arrangements made by the hospitals in London itself.

## Nutrition in time of war

During the last war knowledge of human nutrition which was then new proved to be of great value in dealing with questions of the nation's food supply under conditions of restriction. It is no less vital that his knowledge should be applied now, if similar conditions recur.

## Research on war problems

Some of the medical problems presented by the war cre old ones for which no complete solution had been found. Among these is the question of shock occurring after serious wounds or severe operations. The council have appointed a special committee to review this problem in the light of present-day knowledge, and to organize both laboratory and clinical studies in the subject. Related to this is the question of blood transfusion, with regard to which various institutions. transfusion, with regard to which various investigations are in progress.

Other subjects have taken on fresh aspects under changed conditions. For example, the physiological problems of aviation present themselves in new forms in relation to the flying of modern war machines. In this field the council have been assisting the Royal Air Force, and their secretary is chairman of the special

committee set up by the Air Ministry.

#### Virus diseases

Influenza: epidemic studies.—Dr. Stuart-Harris, working in association with the institute, studied the clinical conditions in a number of successive outbreaks, and collected material from representative cases for laboratory investigation. Even with material from typical cases, all attempts to transmit a virus infection to ferrets and mice were unsuccessful in the early stages, and it was not until the middle of February that evidence of a connection of influenza virus with the outbreak was obtained. From that time onwards the virus was recovered from a proportion of the cases in each outbreak visited; and additional cases gave evidence of its presence in the increase of neutralizing antibodies observed in samples of blood serum taken during and after the attack

Altogether, of the throat-washings obtained from different outbreaks only 7, out of 59 tested, yielded virus infecting ferrets. Some of these strains appeared to be of low virulence for the test animals, though all showed antigenic relationship with some of the strains obtained in the more typical epidemics of earlier

Dimensions and properties of viruses.—In collabora-tion with Dr. T. F. McNair Scott at the Wellcome Research Institution, Dr. Elford has applied his methods of ultrafiltration and differential centrifugation to determining the dimensions of the infective units of lymphocytic chorio-meningitis; this is a virus disease affecting the brain membranes of mice, and has in more than one laboratory been accidentally found to be transmissible to man. The diameters of the units, as determined by these independent methods, showed excellent agreement, the calculated average values being 50 and 46 millimicrons respectively (a millimicron being a millionth of a millimetre).

## Immunology

Reversed anaphylaxis.—Dr. van den Ende has completed an investigation, which he had undertaken at Cambridge, on the phenomenon termed 'reversed anaphylaxis'. It was known that if an antiserum to guinea-pig serum was prepared by a course of injections into a rabbit, the serum of ve immunized rabbit evoked in a normal guinea-pig a train of symptoms closely resembling that observed in the ordinary anaphylactic shock. The completion of the experiments has been deferred by the incidental discovery that the ar body globulin, from the serum of a rabbit immunized against pneumococcus (type I), is a distinct antigen from the corresponding globulin of normal rabbit's serum—a point of interest at least as great as that which led to the experiment.

Tissue fixation of antibodies.—A further technical advance has been made in the method, by the discovery

that the sensitizing fixation of antibodies-producing a condition of passive anaphylaxis—does not require the maintenance of the organ in a state of physiological activity at body temperature.

Bacterial antigens.—Dr. Elford has initiated a physicochemical study of the molecular dimensions of these antigens, and of the polysaccharide haptenes which can

be dissociated from them.

#### Leprosy

Sir Patrick Laidlaw has made experiments which have an interesting bearing on the relation between human leprosy and that occurring in the rat. The rat disease, which is caused by an organism very similar to that found in the leprous lesions of man, is relatively rapid in development and is transmitted without diffi-culty from rat to rat; but there was only one previous record of a successful attempt to transmit leprosy to the rat by material from a case of leprosy in man. During the past year material from cases of human leprosy in the Belgian Congo had been sent by air mail to Dr. A. Dubois of Antwerp, and this had been

used to inoculate Syrian hamsters.
With this material Sir Patrick Laidlaw found remarkably easy to transfer a rapidly spreading infec-tion not only to hamsters but the readiness with which the infection was transmitted to rats as well as hamsters, and the observations made on the tissues of these animals after death, suggested to Sir Patrick Laidlaw that the human lesions from which the material was originally obtained were due to infection with the organism of rat leprosy, and not with the organism of the usual human type. This opinion has been confirmed by Dr. Dubois and also by Professor Adler, to whom microscopic preparations and descriptions of the findings were submitted.

With regard to the infection of hamsters with the bacillus of typical human leprosy, it is important to distinguish mere survival of organisms at the site of inoculation from active multiplication and infective

spread to other tissue. Sir Patrick Laidlaw has spread to other tissue. Sir Patrick Laidlaw has accordingly studied the behaviour of a number of other investigation. Sigh organisms differ from true leprosy bacilli in being gipalste of growth on artificial media. In most case to could be recovered from the sites of inoculation to amsters as long as six months after injection; but the survival was strictly local, no openiums being found in the lymph glands, spleen, argains and the recovered from the sites. liver, or other organs. A mycobacterium obtained from butter survived for months in this restricted manner, as well as those which had originally been found in association with leprous lesions.

## Protistology

By the methods which had already proved so fruitful By the methods which had ances, but in the study of the life-cycles of Entamæba histolytica and Entamæba coli, Mr. Dobell has now worked out a large part of the life-cycle of Endolimax nana. He has made further progress with the study of the intestinal flagellates of these hosts, and the knowledge of them required for practical purposes is now nearly complete. Attention has also been given to the flagellate commonly found in the human mouth, with a view to deciding the proper nomenclature of this

[These are a few abstracts from this interesting and valuable report which is all we are unfortunately able to find space for. Important work has also been done on chemotherapy and endocrinology and many other subjects. Apart from the amount of information obtained in this report the list of 37 special committees at the end indicates the wide scope the activities of the Medical Research Council covers. All research workers should have a copy as from it they may gain ideas for lines of their own researches or, on other hand, be prevented from overlapping in work that is being efficiently pursued elsewhere. It is published by His Majesty's Stationery office and the price is three shillings.—Editor, I. M. G.l

## 1 in 028 09cr Correspondence

## ROUTINE TREATMENT OF EPILEPSY, WITH SNAKE VENOM

To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,-Cobra and Russell viper venoms are used together in the treatment of epilepsy. The former acts as an anticonvulsant drug, and also probably reduces sensitivity of the higher centres to extraordinary incoming impulses. Russell viper venom appears to alter the mineral and water metabolism and thus influences the epileptic convulsions. In addition to this, extract of Rauwolfia serpentina is added to the venom thereby since it is a good news could be a series and the series of the series and the series and the series are series and the series are series and the series are series as a series are series are series as a series are series are series as a series are series are series as a series are series as a series are series therapy since it is a good nerve sedative, hypnotic and lowers blood pressure, and thus lowers cerebral excitability. The treatment may be detailed briefly as

ROUTINE TREATMENT OF EPILEPSY WITH VENOMS Drugs to be used:-

(1) Cobra venom 1 to 10 mouse units (m. u.).
(2) Russell viner venom 2 to 22

Russell viper venom 2 to 20 mouse units. Extract Rauwolffor serpentina 10 to 30 drops in water, twice do

Intramuscular bi-weekly injections of cobra and Russell viper venom, mixed together in the following

Dose no. 1. Cobra venom 1 m. u. and Russell venom

Dose no. 2. Cobra venom 2 m. u. and Russell venom 4 m. u.

Dose no. 3. Cobra venom 3 m. u. and Russell venom 6 m. u.

So on till 10 doses are administered. Rest for one month and repeat the above course again.

Three to four such courses to be completed, later on

one course every six months.

Record of the fits, the dates of occurrence and duration of fits to be recorded, regularly, throughout the treatment.

Extract Rauwolfia serpentina:—

Ten to thirty drops to be given in an ounce of water at bedtime and early morning or when the fits are anticipated. Doses of rauwolfia and venom may be regulated according to the local and general reaction and according to the response of the patient. Bromides and luminal:

These may be given in the beginning to control the fits, and the latter drug if fits are very frequent and severe in type. Dilantin Sodium Kapseals (Parke, Davis & Co.) is another good drug worth trying. It has been reported to have given encouraging results and is preferable to have

A paper on the above treatment as employed at the School of Tropical Medicine, Calcutta, was read in the Physiological Society in January 1940.

Yours, etc., J. S. CHOWHAN,

M.B., B.S., CAPTAIN, A.I.R.O. Biochemical Standardization Laboratory, All-India Institute Hygiene and Public Health.

CALCUTTA, 23rd March, 1940.

## The Influence of Virol on the Growth of Children

A Summary of Investigations\* published in the "Medical Officer," March 30 and April 6, 1935

NUMBER of children, all receiving their customary home diet, were given either No Supplement, Cod Liver Oil, Halibut Liver Oil (with milk to provide equal calories) or Virol. The experimental scheme provided that each child should have a period on each treatment in turn, in such a way that every possible sequence was included. Rigid statistical control was thus possible.

Gain or Loss in Weight on Various Supplements:-

Supplement	Total gain in ozs. over all periods	Average gain per child per week in ozs. over all periods	Total loss in ozs. during summer period only	Average loss per child per week in ozs. during summer period only
No Supplement	88	0.3	— 103	- 1.4
Cod Liver Oil	287	1.0	<b>— 77</b>	<u> </u>
Halibut Liver Oil with milk	333	1.2	— 184	<b>— 2.6</b>
VIROL	762	2.6	_ 7	<b>— 0.1</b>

Whereas earlier investigations had shown that the mere addition of vitamins had no effect on growth, these investigations have conclusively proved that Virol—a balanced food containing all the necessary vitamins—has a definite and remarkable effect in bringing the rate of growth up to the recommended standard. Virol was the only one of the supplements used that promoted this ideal rate of growth.

Virol was the one and only preparation that maintained the children's weight in the hot weather.

<sup>\*</sup> The full report will be sent on application to Messes. A. H. Wheeler & Co., Sudama House, Wittet Road, Ballard Estate, Bombay.

# ST. BARTHOLOMEW'S HOSPITAL

OPERATION TABLE

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## Latest Improvements

including

Easy to operate Release Lever for lowering the table; Trendelenburg position increased to 55° tilt; Foot operated rubber-covered Floor Brake.

The St. Bartholomew's Hospital Operation Table is now manufactured in five different models and thus supplies a range of modern operation tables embodying the latest ideas of well-known surgeons for carrying out surgical operations.

All models can be supplied with either tripod or platform base.



Model A

In Trendelenburg position, 55° tilt,
showing shoulder rests and
instrument tray in position.



## Service Notice

## APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL E. COTTER is confirmed in the appointment of Public Health Commissioner with the Government of India, with effect from the 30th August, 1939.

Lieutenant-Colonel W. J. Webster, M.C., Assistant Director, Control Research Institute, Kasauli, is appointed to officiate as Director of that Institute, vice Colonel J. Taylor, granted leave.

On transfer from Ferozepur, Lieutenant-Colonel K. R. Batra assumed charge of the Office of Civil Surgeon, Jullundur, on the forenoon of the 6th April, 1940.

On transfer from Jullundur, Lieutenant-Colonel Jamal-ud-Din assumed charge of the Office of Civil Surgeon, Rawalpindi, on the afternoon of the 12th April,

On transfer from Montgomery, Major P. C. Dutta assumed charge of the Office of Civil Surgeon, Ferozepur, on the forenoon of the 22nd April, 1940.

On transfer from Campbellpur, Major B. Temple.

Raston assumed charge of the Office of Civil Surgeon, Dalhousie, on the 30th April, 1940.

Captain R. I. Reid is confirmed as Deputy Assistant Director-General (Medical Stores), with effect from the

28th February, 1940.
Captain C. L. Greening, an officer of the Medical Research Department, is appointed to officiate as Assistant Director, Central Research Institute, Kasauli, vice Lieutenant-Colonel W. J. Webster.

Captain H. A. Ledgard is appointed to officiate as an Agency Surgeon, with effect from the forenoon of

the 1st April, 1940, and is posted as Residency Surgeon, Kashmir, with effect from the same date.

Captain F. W. Allinson, Civil Surgeon, Bakarganj, on relief, is appointed to act as First Resident Medical Officer, Presidency General Hospital, Calcutta, vice Captain W. McN. Niblock.

Captain F. W. Allinson made over charge of the Barisal Jail to Dr. N. Das, on the afternoon of the 9th April 1940

9th April, 1940.

Captain J. White, Civil Surgeon, M. Rapore, is appointed to act as Superintendent of the Midnapore Central Jail, in addition to his own duties, vice Major B. Chaudhuri, with effect from the date on which the latter relinquishes charge of that jail to ion the military. join the military.

Captain D. W. Taylor, Civil Surgeon, Dalhousie, has been recalled for military duty and made can charge of his duties at Dalhousie on the 30th April 1940.

Captain F. V. Stonham, Civil, Surgeon, Sargodha, has been recalled for military duty.

#### LEAVE

Colonel J. Taylor, C.I.E., D.S.O., K.H.S., Director, Central Research Institute, Kasauli, is granted leave on average pay for 1 month and 26 days combined with leave on half-average pay for 5 days, with effect tion the 15th April, 1940.

Major W. Aitchison, Civil Surgeon, on 6 months' leave ex-India on Medical Certificate from 12th April. 1940, in continuation of 17 days' leave in India from 26th March, 1940, with permission to prefix the Easter and the Holi holidays from 22nd to 25th March, 1940.

Major M. K. Afridi, Assistant Director, Malaria Institute of India, is granted leave on average pay for 1 month, with effect from the 22nd April, 1940.

Major G. F. Taylor, Professor of Clinical Medicine, K. E. Medical College, Lahore, made over charge of his duties on the 21st April, 1940, and proceeded to England as medical attendant to Mr. D. Gainsford, I.P. He will be treated on 3 months' leave from the date he reaches England.

Captain W. McN. Niblock, First Resident Medical Officer, Presidency General Hospital, Calcutta, is granted leave, with effect from the date on which he is relieved.

#### PROMOTION

Lieutenant-Colonel N. S. Jatar, C.I.E., D.S.O., Inspector-General of Civil Hospitals and Inspector-General of Prisons, C. P. and Berar, has been advanced to the higher position of his rank, i.e., to the rank of Lieutenant-Colonel, selected for increased pay for ability and merit, with effect from 22nd October, 1939.

### RETIREMENTS

Lieutenant-Cole J. P. Canteenwalla. Dated 28th

February, 1940. Lieutenant-Colon M. L. Puri. Dated 13th April, 1940.

Lieutenant-Colonel T. H. Thomas retires on account

of ill health. Dated 3rd March, 1940.

Major G. Dockery retires on account of ill health. Dated 12th February, 1940.

## Notes

## QUINACRINE

## Composition and properties

QUINACRINE is the dihydrochloride of a synthetic acridine derivative with the following formula:—

2-chloro-7-methoxy-5-diethylamino isopentylamino acridine.

The solubility of Quinacrine in water is about 1 in 100, and the solution gives a neutral reaction. Being a dye substance, its administration may be followed

by a harmless yellow pigmentation of the skin. Where it is desired to administer the drug by injection in cases of coma, in very young children and in cases of gastric upset, Quinacrine Soluble (the dimethane sulphonate of the base) is employed.

Quinacrine acts on the asexual forms of all three malarial parasites, as well as on the gametocytes in benign tertian and quartan malaria, but its action on the schizonts of Pl. falciparum is perhaps its outstanding property. Its achieventicital action some to be the

the schizonts of Pl. Jalciparum is perhaps its outstanding property. Its schizonticidal action seems to be the most powerful of any known anti-malarial remedy.

Quinacrine does not cause vertigo, tinnitus or anorexia. Its use is not contra-indicated in pregnancy, in cardiac disease or in blackwater fever. There appears to be some tendency to cumulative effect, and care should therefore be taken to ensure proper spacing of doses and courses of treatment. Quinacrine is of low toxicity, but in susceptible individuals, particularly towards the end of a course of treatment, the drug may give rise to gastric discomfort and occasionally to headaches. These forms of intolerance can be largely prevented by administration of copious fluids and by taking the drug during meals. taking the drug during meals.

Quinacrine Soluble should be given by intramuscular or subcutaneous injection in a daily dosage the same as that of Quinacrine, injections being given once or twice in the course of 24 hours. The contents of the ampoule are dissolved in from 1.5 to 5 c.cm. of sterile distilled water.

### PRAEQUINE

Composition and properties

PRAEQUINE is a salt of a synthetic quinoling derivative, having the following structural formula:—

8-diethylamino isopentylamino-6-methoxy quinoline.

It is a tasteless pale yellow granular powder relatively insoluble in water out readily soluble in alcohol. It has the power, not possessed by other anti-malarial drugs, of destroying the gametocytes of all types of malarial parasites, and it is therefore of particular value as a prophylactic of the disease. It is usually administered following treatment with Quinacrine in order to diminist the likelihood of relapse.

Praequine is a highly active substance and the prescribed dosage must not be exceeded, otherwise toxic symptoms may appear, e.g., severe epigastric pains, nausea, vomiting, headache cyanosis and methæmoglobinuria. The drug should be used with caution in cases of hepatic dysfunction and of severe anæmia.

A variety of techniques of treatment are in common

A variety of techniques of treatment are in common use. In cases of benign tertian and quartan malaria some authorities are content to give Quinacrine by itself in a course of treatment lasting from six to eight days. The temperature usually received to normal by the second or third day, and the parasites can no longer be found in the blood stream after the third or fourth day.

Others give 30 grains of quinine in the first two days of treatment and then change over to Quinacrine for the remainder of the eight days' course of treatment.

It is the practice in some localities to follow a six days' course of quinine, after an interval of two days, by the administration of Praequine for a further live days.

In malignant tertian malaria it is common practice to give a six days' course of Quinacrine followed, after a rest period of two days, by a five days' course of Praequine. Praequine is of particular value in this form of malaria on account of its action upon the crescents.

Treatment with Quinacrine given orally may be replaced by twice daily injections of Quinacrine Soluble, in urgent cases, for two or three days after which the drug can be given by mouth

in urgent cases, for two or three days after which the drug can be given by mouth.

We understand that a copy of the Quinacrine/
Praequine booklet will be forwarded to any member of the medical profession on request to Messrs. May and Baker (India), Limited, 11; Clive Street, Calcutta, India.

## BOVRIL, LIMITED

(FORTY-THIRD ANNUAL GENERAL MEETING)

In 1939 the Povril sales showed a considerable increase over those of 1938. This improvement was to be expected in our home sales, but considering the many abnormal trade conditions roughout the world the increase in our export trade was a very satisfactory feature of our business.

Since the beginning of the war much of our production has been for the Services, and although demands we get add at yet short notice we were note in every get a satisfy them. In this connection is should be added that our Gevernment contracts and how accepted on a cost basis, and the allowed margin of pront is very small. The Ministry of Supply are to be complimented on this policy, as it enables them to purchase at the lowest possible vices. The manufacturer, wever, who is working for the Government on a cost basis may in certain circumstances be involved in losses; this is particularly liberated to happen in a business such as ours, where large stocks of raw materials must be held for normal trading. It may be necessary to draw upon these stocks for special contracts; in this case the stocks must be replaced, but often at greatly increased prices. It is, therefore, clear that in these cases the cost should in a measure be based upon replacement prices, otherwise serious losses may be incurred.

In these days of food rationing and long hours of overtime on the part of industrial workers, the need for Bovril and the goodwill towards it is greater than ever. Needless to say, this ever-increasing goodwill is something we infend to foster and maintain.

Like most firms we already find ourselves working short-handed; of the office staff alone 46 members have joined up.

## Publishers' Notice

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The preparation of reprints entails rearranging the type, so that there is often a delay of a month or more, after the publication of the Gazette, before the reprints are ready. If reprints are not received within two months f blication of the Gazette, contributors should write o the Publishers.

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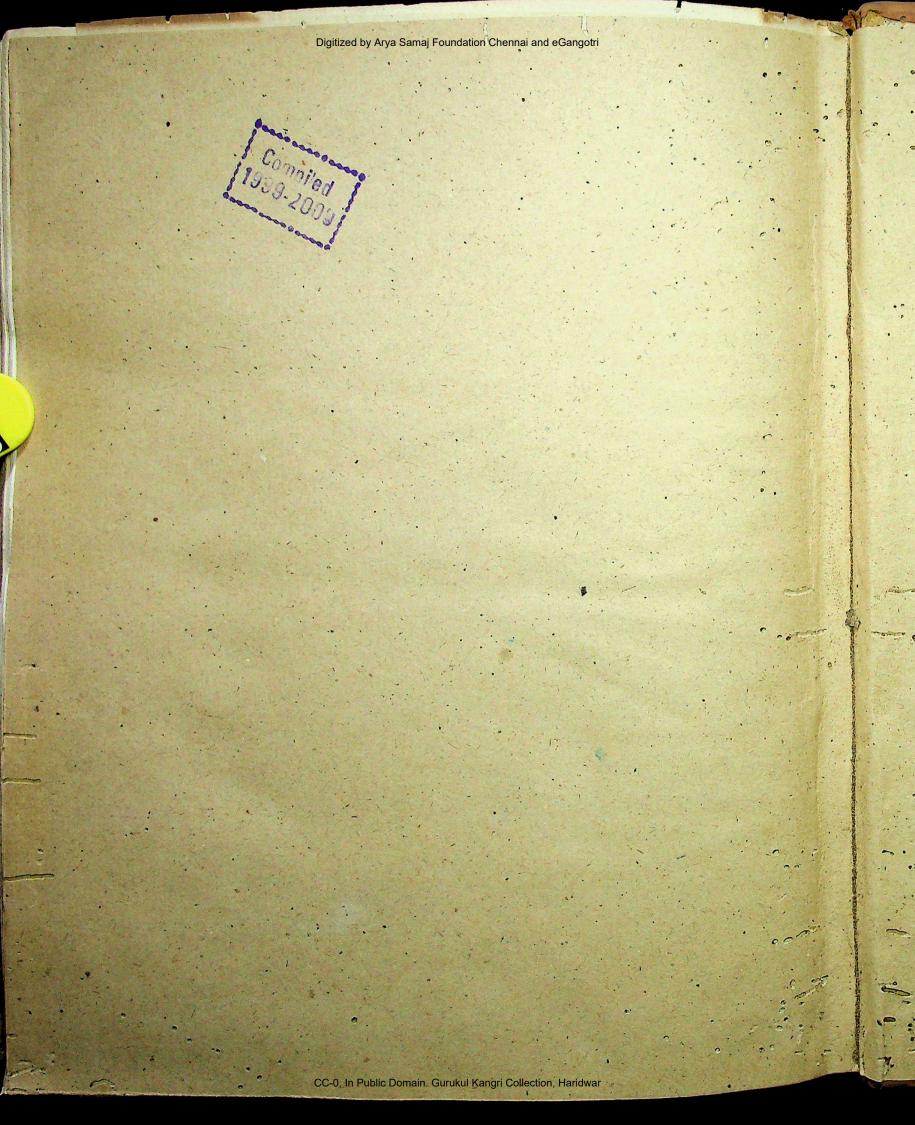
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